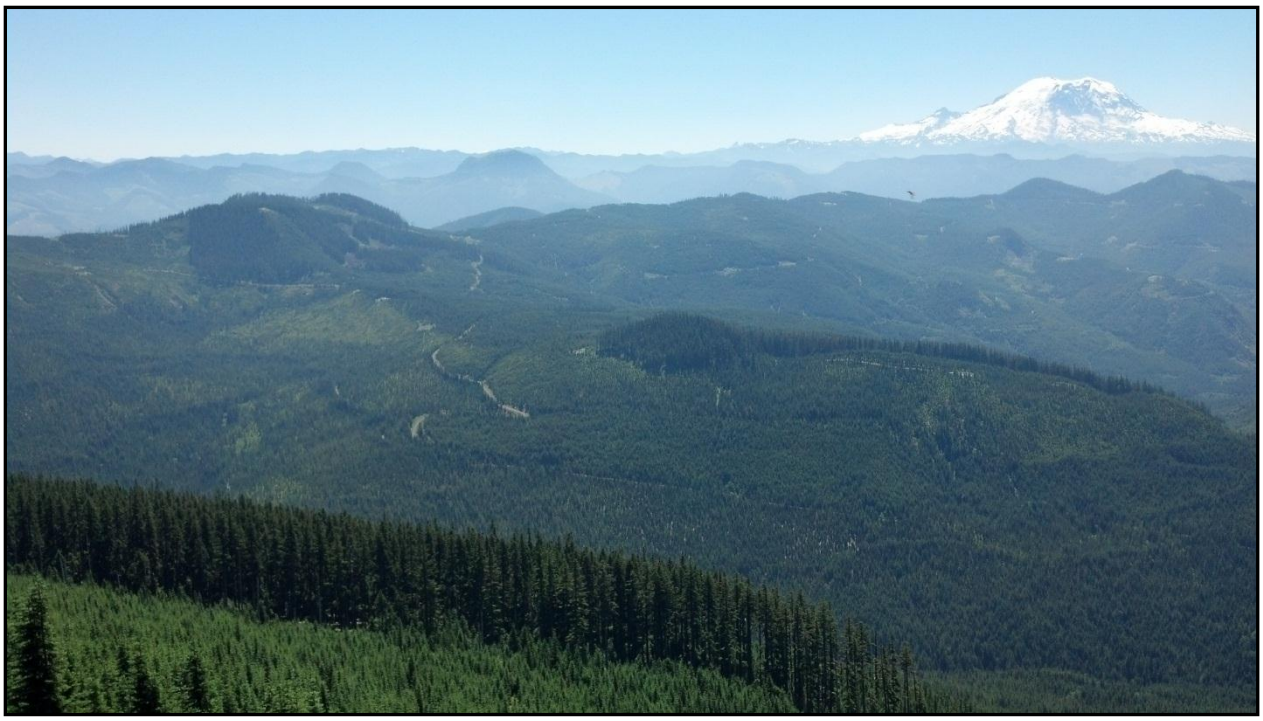
Restoration Thinning Project Report

Cedar River and South Fork Tolt River Municipal Watersheds

2013



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1.0 Background

Upland Restoration Thinning (RT) is the active ecologically-driven treatment of relatively young and dense second-growth forests that have relatively low biological diversity and are in or approaching the competitive exclusion stage of forest succession. The RT program in the Cedar River Municipal Watershed (Cedar) was established by the Cedar River Watershed Habitat Conservation Plan (CRW-HCP) in the year 2000 with the goal of developing complex habitat and accelerating late-successional forest habitat characteristics. A similar program was adopted for the South Fork Tolt River Municipal Watershed (Tolt) in 2011. Prior to these programs, an analogous pre-commercial thinning program treated young forest stands in the Cedar with commercial forestry goals (e.g., maximizing individual tree growth for future harvest by creating evenly spaced trees, often of a single species). The RT program is defined more specifically in the Cedar River Municipal Watershed Upland Forest Habitat Restoration Strategic Plan (2008), and treatment priorities are specified in the Landscape Synthesis Framework for the Cedar River Watershed Habitat Conservation Plan (2009). Through the planning process that developed these detailed documents, RT treatment units were identified based on their current age, height, and stand condition, and prioritized based on their proximity to highly valued habitat (e.g., old-growth forest, riparian, and wetland areas).

RT projects have been implemented in the Cedar since 2000, with planning and implementation occurring on an annual cycle. This is the first year of RT in the Tolt. Treatment prescriptions have evolved through an adaptive management process as project monitoring informs whether goals and objectives are being attained. Budgeting for RT projects under the CRW-HCP were scheduled to sunset in 2014, but programs spending targets have been reached following the 2013 season. This plan provides descriptions and treatment plans for individual forest units identified for treatment in 2013.

1.1 2013 RT Project Overview

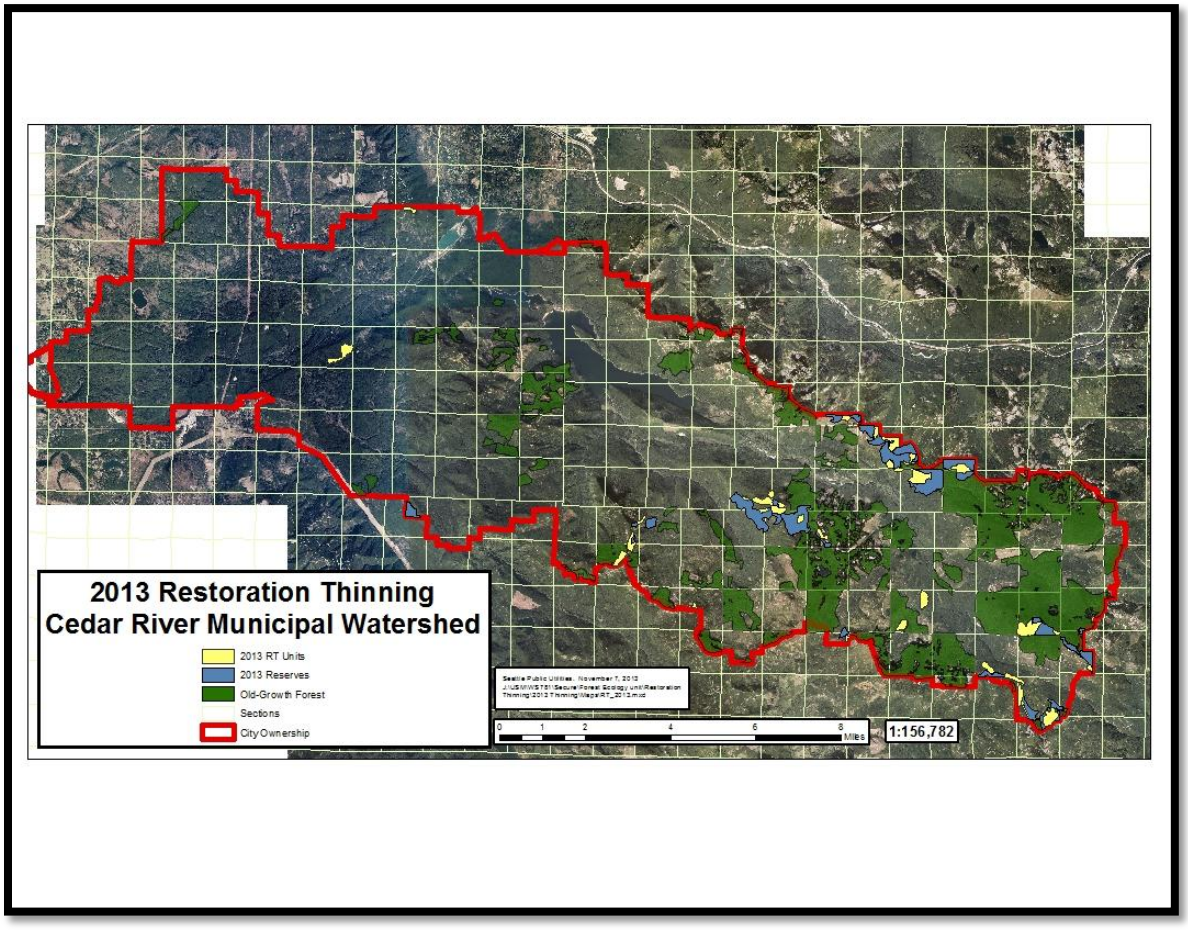
The areas prioritized for RT in 2013 were:

- Left over units from the snow-shortened 2012 RT season (363 acres) in the 150 and 300 road systems;
- Remnant young forest stands in the 200 and 600 road systems;
- Other potentially suitable stands as identified by the Landscape Synthesis Framework; and,
- Areas on the south ridge (30 road system) of the Tolt.

All totaled, 34 RT units were identified in the Cedar encompassing 929 acres, and seven units were identified in the Tolt encompassing 255 acres. In addition, 1,505 acres of young forest in the Cedar was designated as unthinned reserves because they either already had patchy tree distributions that would not likely be ecologically improved upon by active restoration treatments, had a relatively large component of trees too big for RT, or had other physical constraints to treatment (e.g., steep rocky cliffs, no road access).

Seasonal restrictions played their role in the 2013 RT season; namely snow, wildlife, fire hazard, and labor. Snow limited access to many of the high elevation (>4,000' asl) units through the Spring and into July. Only a few of the units were not in proximity to old-growth forest where potential impacts to nesting wildlife species of concern (e.g., northern spotted owl, marbled murrelet, northern goshawk) prohibits treatment until after September 22nd. In conjunction with the wildlife concerns, industrial fire precautions were at levels three and four in August, meaning that chainsaws could not be used in the forest for a full day of work until almost the beginning of September. And finally, the availability of labor to one of the primary contractors of the program was limited by his commitments to work in Alaska and his ability to obtain work visas for additional crew members because of the U.S. federal government shutdown.

That said, one RT contractor (Coronel) worked from 8/27 to 11/1 while the other (Ramirez) worked from to 9/5 to 10/30, and all the units (41) and areas (1,184 acres) were completed to the treatment specifications. The contractor costs of $236,958 equates to $200/acre, significantly less than was projected.



2.0 Goals and Objectives

The overarching goal of RT is to accelerate the development of complex habitat in the near-term and late-successional and old-growth forest conditions in the long-term. Objectives of RT include:

- Reduce competition among trees.
- Stimulate tree growth.
- Increase light penetration under the top tree canopy.
- Increase tree and understory plant species diversity.
- Accelerate forest development beyond the competitive exclusion stage towards a more biologically diverse stage.
- Extend the forest development stand initiation stage such that diverse species become established and diverse stand structures develop.
- Reduce long-term fire hazard.
- Increase resilience to catastrophic windthrow, insect, or disease outbreak.

Additional ecological objectives considered in 2013, including methods developed to achieve those objectives are to:

- Provide multiple development pathways for variable forest stand structures.
    - Variable residual tree densities and tree sizes; stand scale reserves; numerous skips.
- Increase connectivity and structural variability of riparian areas.
    - Buffer or retain higher tree densities along streams and inner gorges.
    - Provide habitat connectivity between forest and wet meadows, primarily for elk and deer.
- Maintain/increase huckleberry growing space in designated areas where tree growth could be limiting.

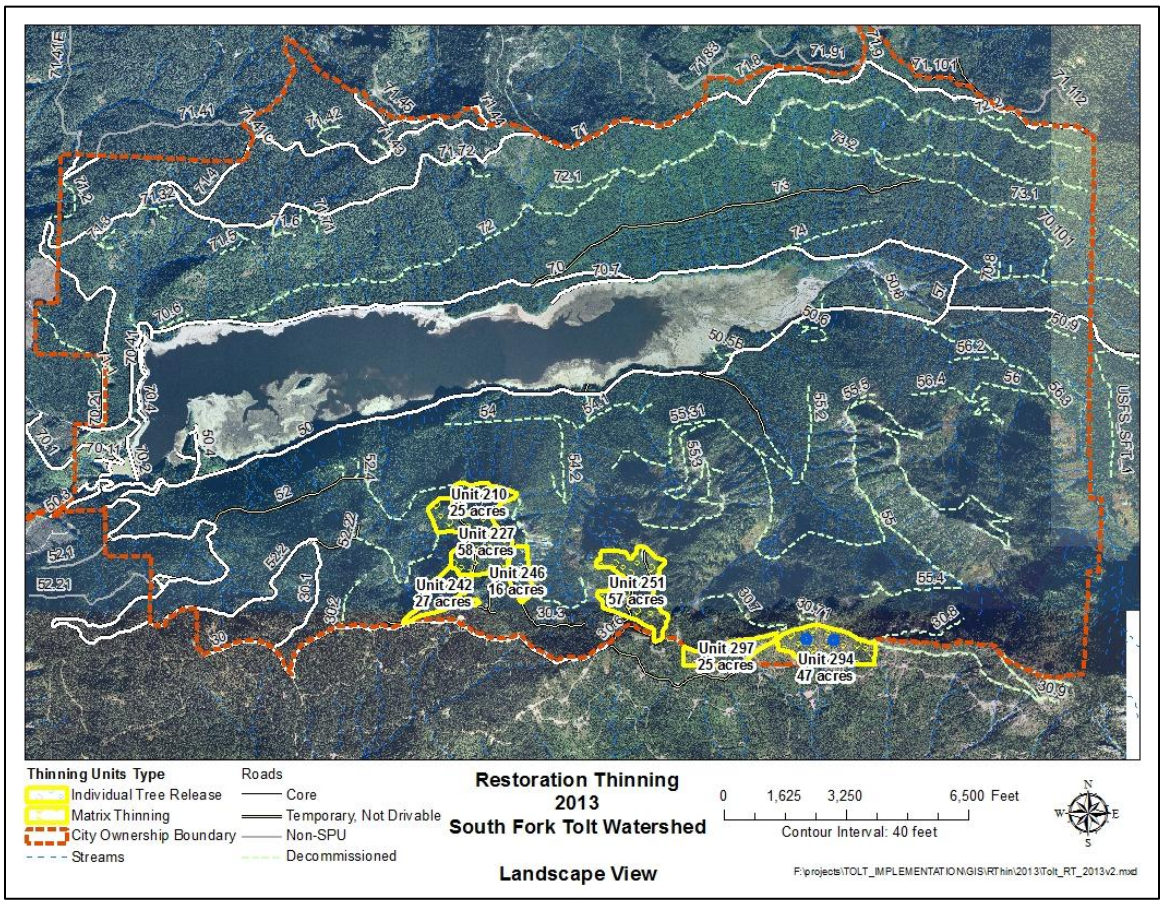
2.1 Landscape Perspective

Each unit can be characterized by its unique features and how it relates to other features on the landscape. Relatively high elevation units, for example, contain many unique features such as talus slopes, rock outcroppings, and shrub openings, as well as stands of old-growth forests adjacent to and within the landscape planning area. Three key landscape criteria shaped the thinking behind individual thinning prescriptions including decisions to place areas in reserve status:

- Individual unit objectives and unique features (e.g., what special characteristics does a particular unit have when compared to other units and how should the unit objectives be tailored to protect, enhance, and promote those features?).

- The location and characteristics of old-growth forests and special habitats relative to the thinning units (e.g., what locations and characteristics of nearby old growth and special habitats are unique that we should consider them in the prescriptions?).
- The proximity and location to previously thinned stands (e.g., what should be done differently now considering the prescriptions and ecological response of nearby previously thinned stands?).

Additional details can be found on the maps of each thinning unit later in this report.



3.0 Costs, Area Treated, and Compliance

For 2013, the total area treated was 1,184 acres at a cost of $236,958.00 for an average cost per acre of $200.13 (Table 1). All work was paid at an hourly rate that was bid prior to the start of work. A not-to-exceed (NTE) amount was established at 133% of the respective contractors winning bid price. All work was completed for $93,343.00 less than the overall NTE amount.

Compliance plots were measured at a density of roughly one plot for every two acres of treatment with a minimum of four plots per unit. Plots were intended to be distributed throughout the unit. Treatment quality exceeded 89% for each unit.

4.0 Unit Summaries

This section provides the information specific to each unit. Table 1 summarizes unit information, treatments, and post-thinning tree densities. The table also shows information for units designated as reserve (or untreated). Maps showing each thinned unit follows the table.

Table 1. 2013 Restoration Thinning Data

11/19/2013

Cedar River Municipal Watershed

Unit	Road System	Location			Elevation (')	Acres		Treatment Prescription							Contractor ①	Date Completed	Compliance Plots		Trees Per Acre			Average DBH (")	Post-Treatment Abundance (%) ②								Cost ($)	
		T	R	S		Treatment	Reserve	Spacing (')	Diameter Limit (")	Species to Cut	Skips (1/5 acre)	Gaps (1/5 acre)	Lop/Pile ③	Comments			#	Quality (%)	Min	Average	Max		DF	MH	NF	RA	RC	SF	WH	WP	Total	Cost/ Acre
110	Via Green River Roads	21	8	4	1,520 - 1,880	**0**	47							Developing nicely; hard to reach; four acres of dense hemlock.																		
137	22	23	8	33	2,760 - 3,000	**17**	0	16	5	SF>WH	4	0	N		Coronel	10/4	9	98	250	644	1,000	8.2	1	0	0	0	5	**35**	**59**	0	6,237	367
CTUT ④	61	22	8	18	1,160 - 1,400	**66**	0	16	5	WH	0	0	N	Cutting only understory WH. Consider only WH<7" in spacing.	Coronel	10/2	38	99	0	159	320	2.6	0	0	0	1	7	0	**92**	0	8,526	129
21.4	150	22	10	19	3,560 - 4,240	**14**	45	13/18	5	SF	2	0	N	Space 18' from NF, DF, and WWP.	Ramirez	9/19	7	97	400	479	750	3.4	0	**37**	3	0	0	**58**	1	0	2,408	172
28.2	150	22	10	20	3,510 - 4,240	**17**	42	13	6	SF	3	0	N	Pull slash 10' from trail.	Ramirez	9/6	9	96	260	304	360	4.2	1	0	1	0	1	**87**	9	0	3,210	189
43	150	22	10	27, 34	3,440 - 4,680	**45**	119	16	5	SF>WH>NF	7	0	N		Coronel	10/18	23	100	200	354	650	4.4	1	16	7	0	0	**77**	0	0	9,424	209
58	150	22	10	33	2,440 - 4,280	**76**	173	15	6	SF>WH>DF	9	0	N	25' stream buffer.	Ramirez	9/16	24	100	150	310	550	6.4	12	0	18	4	2	**48**	15	0	7,448	98
84A	150	22	10	29	2,720 - 3,320	**19**		15	6	SF>WH>DF	4	0	N		Ramirez	9/12	10	100	100	280	400	7.4	**79**	0	0	0	7	7	7	0	2,356	124
84B	150	22	10	29, 32, 33	2,760 - 3,240	**11**	132	16	6	SF>WH>DF	3	0	N		Ramirez	9/12	6	100	100	300	600	5.3	**72**	0	0	0	17	6	6	0	1,265	115
84C	150	22	10	28	3,500 - 3,900	**21**		13	6	SF	3	0	N	Should have thinned NF too.	Ramirez	9/18	11	98	400	532	600	5.1	3	10	**41**	0	0	**44**	3	0	3,612	172
85	150	22	10	29	2,920 - 4,160	**51**	100	13	7	SF	8	0	N	Pull slash 10' from trail.	Ramirez	9/11	26	97	150	325	600	4.7	1	5	0	0	0	**75**	20	1	10,404	204
18A	200	21	9	15	4,000 - 4,160	**8**	0	15	5	SF	0	0	N		Coronel	10/21	4	97	200	463	700	7.2	0	5	0	0	0	**89**	5	0	4,435	554
19 ⑤	200	21	9	8	3,760 - 4,200	**32**	0	45	8	All	0	0	N	Individual tree release.	Coronel	10/15	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,049	95
64A	200	21	9	5, 8	3,840 - 4,320	**30**	7	15	5	SF	9	0	N		Coronel	10/14	15	99	200	510	800	7.7	0	0	0	0	0	**95**	5	0	9,355	312
64B	200	21	9	4, 5	3,480 - 4,160	**11**	7	15	5	SF>WH	2	0	N		Coronel	10/7	5	100	600	720	900	8.2	4	0	0	0	0	**82**	14	0	4,435	403
103	200	21	9	4	2,680 - 3,480	**0**	33							Too steep; bisected by 40-60' cliff band; Pacific yew present; stream erosion concerns.																		
73	300	21	10	6	3,080 - 3,800	**18**	19	14	5	SF>WH	2	0	N	25' buffer on Findley Creek.	Ramirez	10/9	9	100	200	306	400	4.9	0	0	15	0	2	**82**	2	0	2,772	154
104	300	21	9	1	2,300 - 4,080	**15**	178	14	6	SF>WH	4	0	N		Ramirez	10/9	8	100	150	256	450	4.2	2	5	12	0	12	**44**	24	0	2,505	167
127A	300	22	9	35	3,520 - 3,650	**7**		15	6	SF	1	0	N		Ramirez	9/23	4	100	300	463	850	5.8	3	3	0	0	0	**57**	**38**	0	1,309	187
127B	300	22	9	35	3,600 - 3,880	**45**		13	6	SF	6	0	N		Ramirez	9/26	23	99	250	517	850	6.2	1	5	0	0	0	**75**	20	0	8,280	184
127C	300	22	9	36	3,680 - 3,880	**10**	227	13	5	SF	3	0	N		Ramirez	10/7	5	100	350	440	550	3.5	0	**32**	0	0	0	**68**	0	0	1,870	187
127D	300	22	9	36	3,840 - 4,200	**35**		14	5	SF	6	0	N		Ramirez	10/7	18	92	150	614	1,150	4.2	0	17	5	0	0	**57**	22	0	6,545	187
127F	300	21	9	2	3,640 - 4,040	**11**		16	6	SF>WH	2	0	N		Ramirez	9/23	6	95	300	342	400	5.7	2	0	0	0	0	**93**	5	0	1,870	170
131	300	22	9	35, 36	3,080 - 3,600	**13**	0	15	6	SF>WH	3	0	N		Ramirez	10/8	7	100	350	507	700	6.7	10	0	3	0	17	**37**	**34**	0	2,145	165
19A	550	21	11	19	4,280 - 4,400	**9**	1	14	6	SF	2	0	N		Ramirez	10/17	5	97	300	400	500	5.9	0	**25**	8	0	0	**68**	0	0	2,241	249
26A	550	21	10	13	4,280 - 4,920	**96**	70	15	5	SF>WH	14	3	Y	Lop/pile in gaps and within 100' of road.	Ramirez	10/18	44	98	0	241	600	3.2	1	16	13	0	0	**70**	1	0	21,888	228
26B	550	21	10	13	4,280 - 4,920	**8**		15	5	SF	0	3	Y	Lop/piled in gaps.	Ramirez	10/16	4	100	150	275	450	1.2	5	18	23	0	0	**55**	0	0	2,384	298
46	550	21	10	23	3,320 - 4,120	**0**	20							Previously ID'd as a reserve.																		
48	550	21	11	18, 19	4,720 - 4,880	**0**	8							<15' tall; patchy with huckleberries.																		
105	550	21	11	19	4,200 - 4,720	**0**	43							Steep; small trees <6'; patchy to 5,000 tpa; outside hydro boundary.																		
141	550	21	11	19	4,760 - 4,880	**0**	33							Patchy with open huckleberry "highways" and dense pockets; twisted snow boles.																		

Table 1. 2013 Restoration Thinning Data (continued)

11/19/2013

Cedar River Municipal Watershed

Unit	Road System	Location			Elevation (')	Acres		Treatment Prescription							Contractor ①	Date Completed	Compliance Plots		Trees Per Acre			Average DBH (")	Post-Treatment Abundance (%) ②								Cost ($)	
		T	R	S		Treatment	Reserve	Spacing (')	Diameter Limit (")	Species to Cut	Skips (1/5 acre)	Gaps (1/5 acre)	Lop/Pile ③	Comments			#	Quality (%)	Min	Average	Max		DF	MH	NF	RA	RC	SF	WH	WP	Total	Cost/ Acre
12	600	21	10	23	3,080 - 3,400	**0**	34							Adjacent part is included in unit 12A.																		
12A	600	21	10	23	2,960 - 3,240	**29**	0	16	6	SF	9	0	N		Ramirez/ Coronel	11/1	15	100	350	523	850	7.1	6	0	0	0	2	**83**	9	0	7,221	249
12B	600	21	10	25, 26	3,360 - 3,560	**29**	0	16	6	SF	9	0	N		Ramirez	10/29	15	96	300	607	1,050	7.3	12	0	2	0	2	**74**	12	0	7,221	249
35.1	600	21	10	18, 19	3,360 - 3,680	**0**	19							Bigger trees; surrounded by thinned units.																		
35.2	600	21	10	19	3,680 - 3,840	**6**	0	14	6	SF	2	0	N		Ramirez/ Coronel	10/22	4	100	500	538	600	8.4	0	0	7	0	0	**91**	2	0	1,284	214
93	600	21	11	30	3,200 - 3,320	**0**	39							Valley bottom meadow; previously ID'd as a reserve.																		
100	600	21	10	9	2,760 - 3,160	**44**	0	15	5	SF>WH	10	0	N		Ramirez/ Coronel	10/29	22	95	200	432	650	7.0	20	0	1	0	7	**58**	14	0	8,712	198
101A	600	21	10	25	3,600 - 3,800	**33**		15	5	SF	9	6	Y	Lop/pile in gaps and within 100' of road.	Ramirez	10/22	17	89	0	471	1,450	5.3	1	**32**	2	0	0	**64**	1	0	8,184	248
101B	600	21	10	25	3,720 - 3,880	**10**	109	15	5	SF	0	0	N		Ramirez	10/22	5	94	300	700	1,300	6.0	0	**43**	4	0	0	**53**	0	0	2,480	248
101C	600	21	10	25, 36	4,040 - 4,400	**65**		14/15	5	SF	14	3	Y	14' spacing below road, 15' above. Lop/pile in gaps.	Ramirez	10/18	38	93	150	291	450	3.6	2	8	1	0	0	**87**	1	0	14,820	228
614	600	21	10	16	2,920 - 3,160	**27**	0	15	6	SF>WH	8	0	N		Ramirez/ Coronel	10/24	14	100	200	418	750	7.7	9	0	0	0	2	**83**	6	0	6,210	230
MIT ⑥	600	21	11	30	3,760	**1**	0	15	6	All	0	0	Y	Expansion of existing meadow; entire unit lop/piled.	Ramirez	10/24	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Subtotal						**929**	1,505				32.7 acres	3.0 acres	16.0 acres			11/1	450	97	0	386	1,450	5.2	6	8	5	0	2	**62**	17	0	186,105	200

South Fork Tolt River Municipal Watershed

Unit	Road System	Location			Elevation (')	Acres		Treatment Prescription							Contractor ①	Date Completed	Compliance Plots		Trees Per Acre			Average DBH (")	Post-Treatment Abundance (%) ②								Cost ($)	
		T	R	S		Treatment	Reserve	Spacing (')	Diameter Limit (")	Species to Cut	Skips (1/5 acre)	Gaps (1/5 acre)	Lop/Pile ③	Comments			#	Quality (%)	Min	Average	Max		DF	MH	NF	RA	RC	SF	WH	WP	Total	Cost/ Acre
210 ⑤	30	26	9	33	3,000 - 3,640	**25**	0	50	NA	SF>NF, DF	0	0	N	Individual tree release.	Coronel	9/30	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,966	119
227 ⑦	30	26	9	33	3,200 - 4,000	**58**	0	14	7	>DF	0	0	N	10' buffer on rock faces.	Coronel	9/30	0	100	-	-	-	-	-	-	-	-	-	-	-	-	17,321	299
242 ⑤	30	25	9	4	3,640 - 4,080	**27**	0	50	NA	SF>NF, DF	0	0	N	Individual tree release.	Coronel	9/30	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,966	110
246 ⑤	30	26	9	34	3,120 - 3,800	**16**	0	50	NA	SF>NF, DF	0	0	N	Individual tree release.	Coronel	9/30	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,022	126
251	30	25	9	3	3,120 - 4,360	**57**	0	14	7	>DF	0	0	N	10' buffer on rock faces.	Coronel	9/30	10	100	200	280	400	6.5	16	2	0	0	0	**68**	14	0	11,020	193
294	30	25	9	2	3,120 - 3,880	**47**	0	18	6	>DF, WH	2	0	N	Skips are 3/4 acre.	Coronel	9/30	11	100	250	318	400	6.6	0	0	1	0	0	**71**	**27**	0	12,705	270
297 ⑤	30	25	9	2	3,440 - 4,080	**25**	0	40	NA	SF>WH, DF	0	0	N	Individual tree release.	Coronel	9/30	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,853	74
Subtotal						**255**	0				0.4 acres	0	N			9/30	21	100	200	300	400	6.6	8	1	1	0	0	**70**	21	0	50,853	199
Total						**1,184**	1,505				33.1acres	3.0 acres	16.0 acres			11/1	471	97	0	382	1,450	5.2	6	7	5	0	2	**62**	17	0	236,958	200

① Ramirez/Coronel means that the unit was awarded to Ran

② **Bold** is over 25% of the abundance.

③ Lop/pile administered and paid for by MIT.

④ CTUT is a western hemlock understory thinning unit.

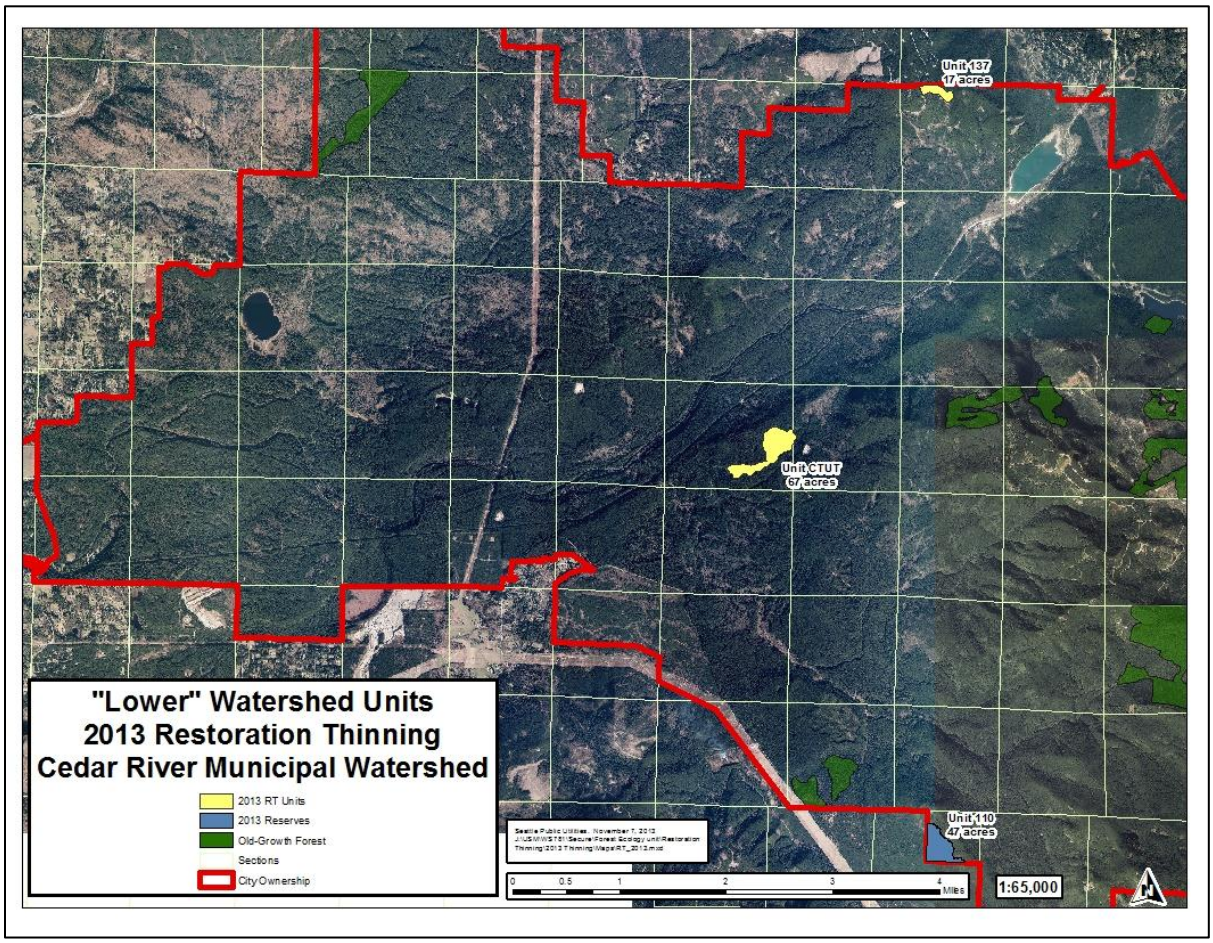
⑤ These units had an "Individual Tree Release" prescription where regular compliance plots are ineffective.

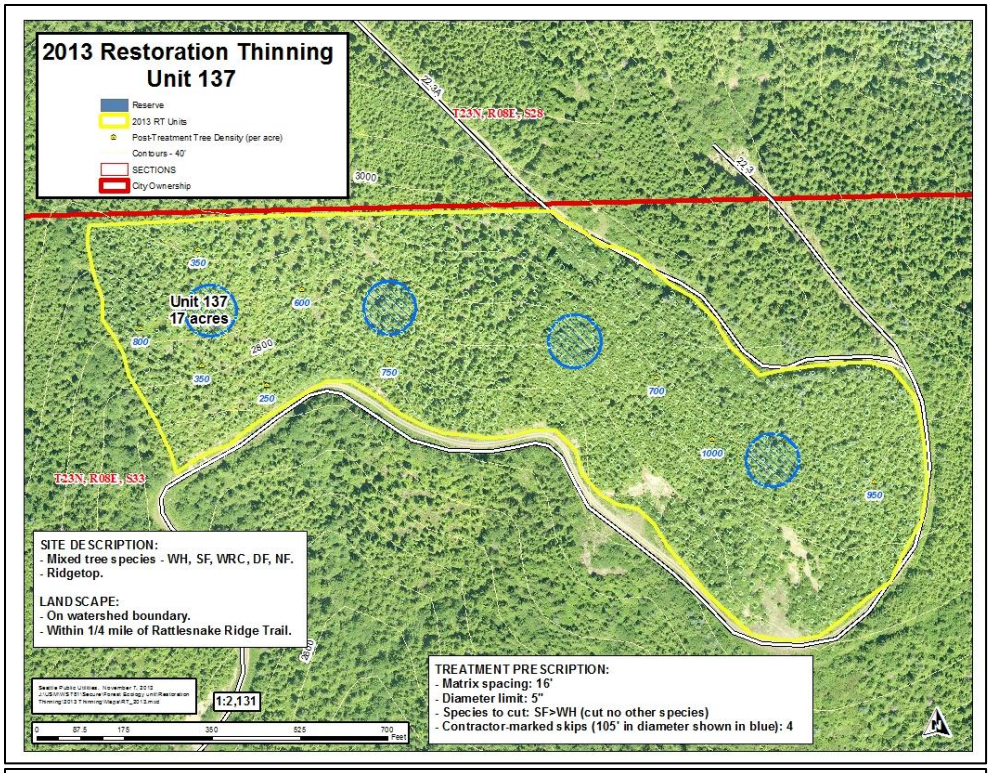
⑥ Small meadow explansion off of 680 road managed by MIT.

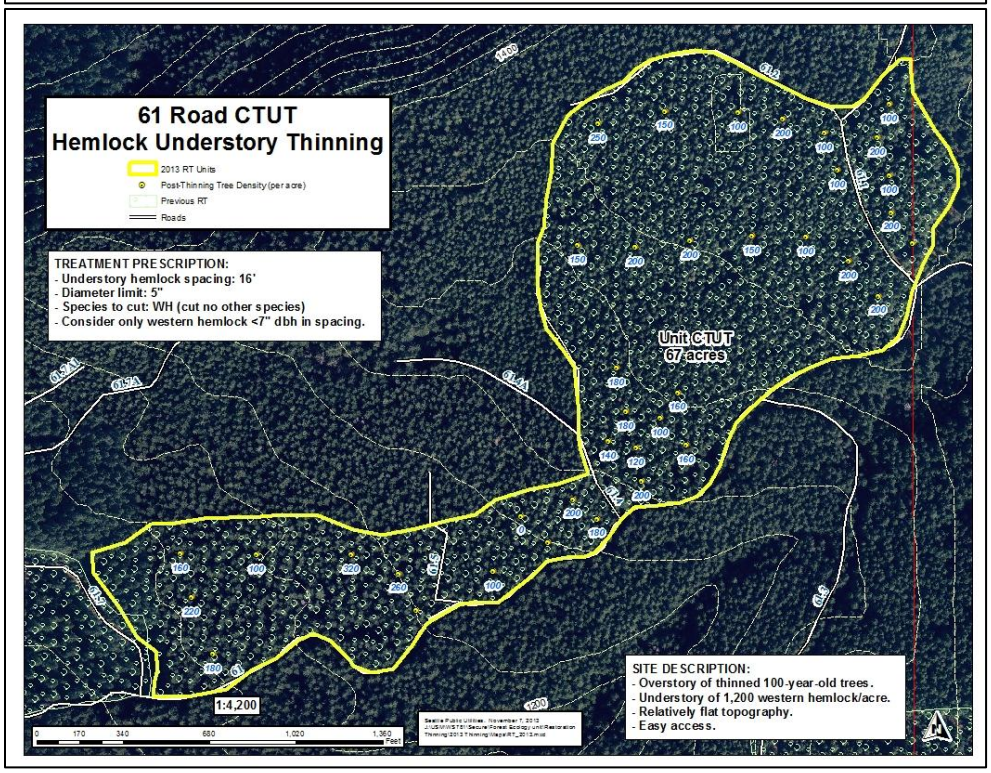
⑦ No compliance data was taken.

The following unit maps are divided into road access areas and preceded by a landscape map of the road sub-area. Please note that post-treatment tree density is included from compliance plot locations:

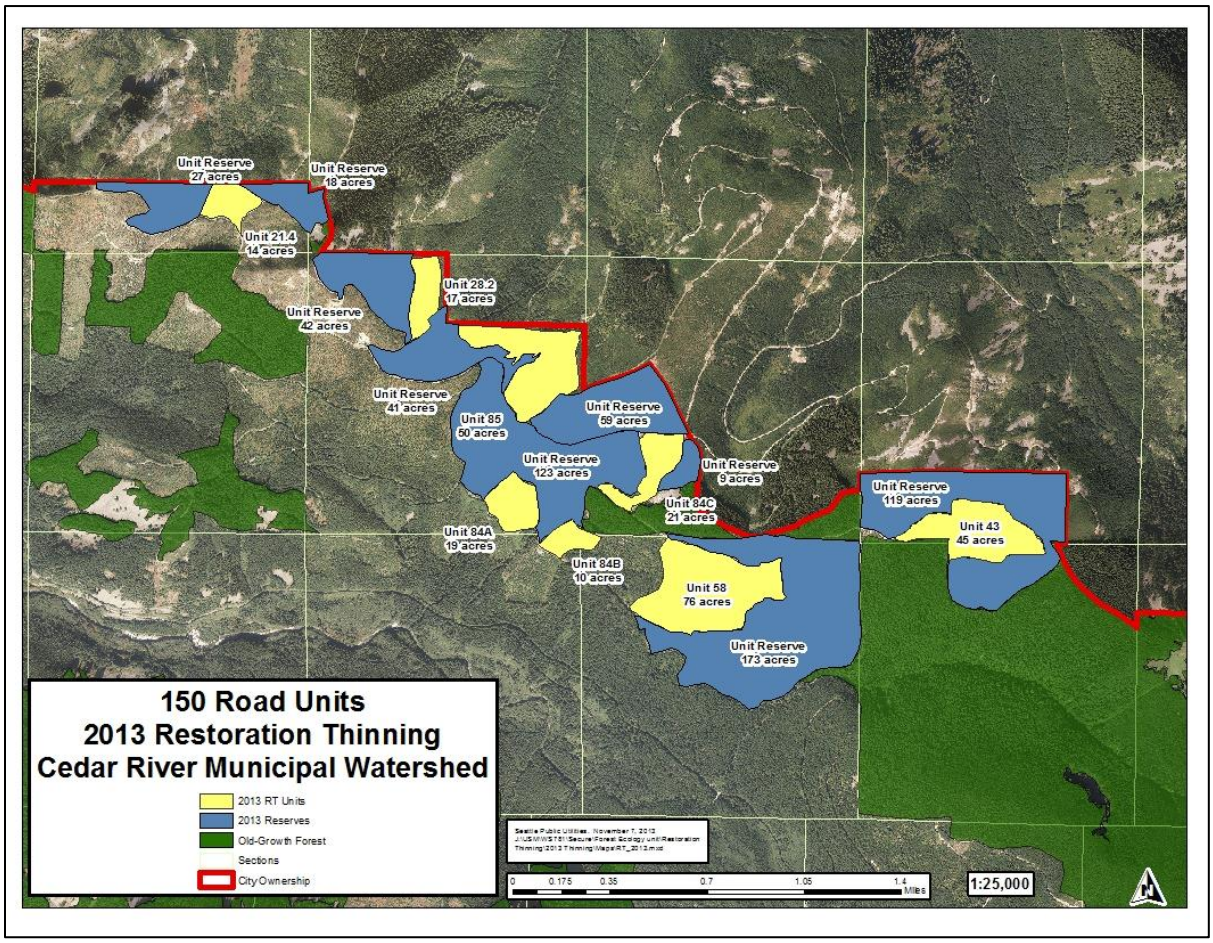
The Lower Cedar Watershed Units:

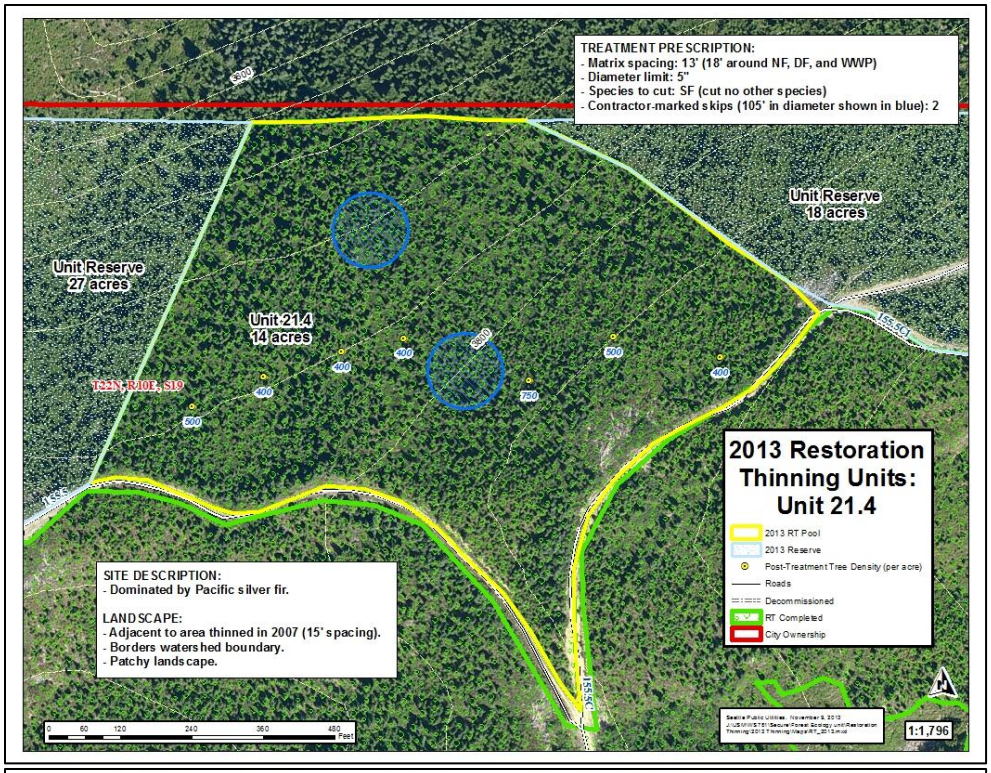


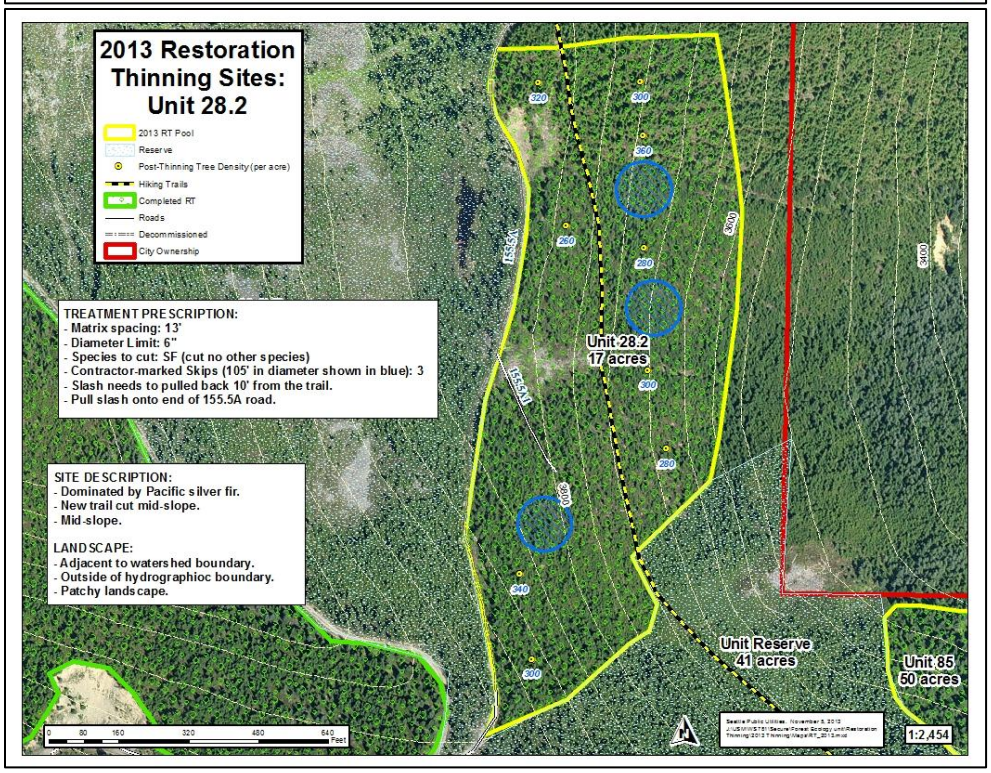

2013 Restoration Thinning
Unit 137
Reserve
2013 RT Units
Post-Treatment Tree Density (per acre)
Contours - 40'
SECTIONS
City Ownership
T23N, R08E, S28
T23N, R08E, S33
Unit 137
17 acres
SITE DESCRIPTION:
- Mixed tree species - WH, SF, WRC, DF, NF.
- Ridgetop.
LANDSCAPE:
- On watershed boundary.
- Within 1/4 mile of Rattlesnake Ridge Trail.
TREATMENT PRESCRIPTION:
- Matrix spacing: 16'
- Diameter limit: 5"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 4
1:2,131

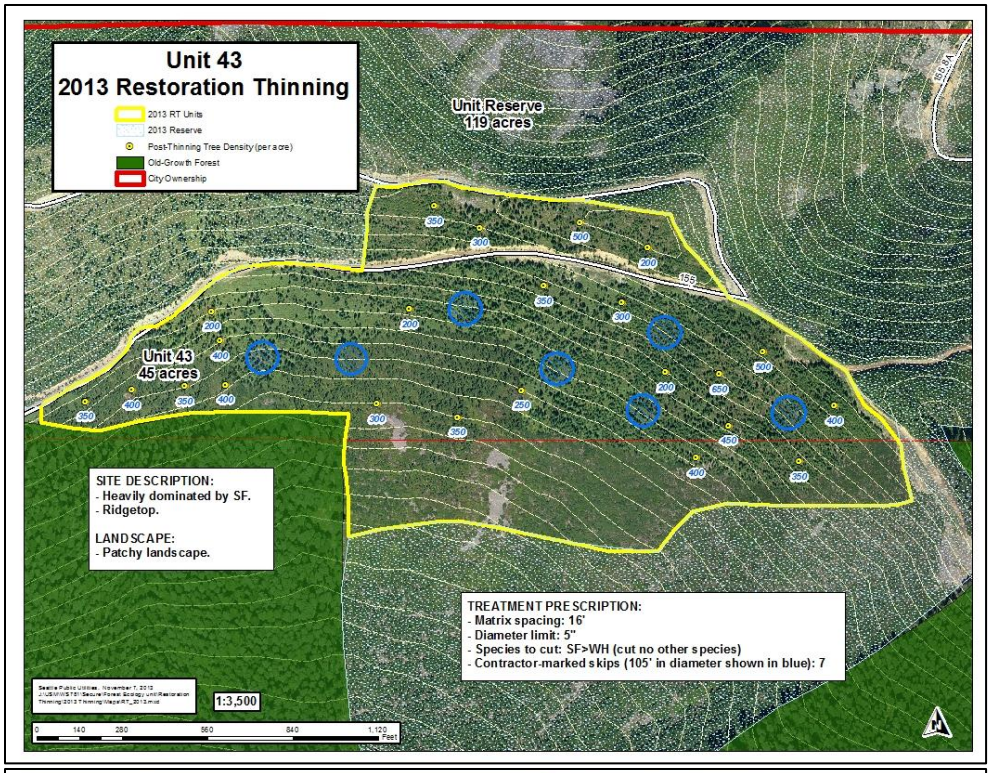

61 Road CTUT
Hemlock Understory Thinning
2013 RT Units
Post-Thinning Tree Density (per acre)
Previous RT
Roads
TREATMENT PRESCRIPTION:
- Understory hemlock spacing: 16'
- Diameter limit: 5"
- Species to cut: WH (cut no other species)
- Consider only western hemlock <7" dbh in spacing.
Unit CTUT
67 acres
SITE DESCRIPTION:
- Overstory of thinned 100-year-old trees.
- Understory of 1,200 western hemlock/acre.
- Relatively flat topography.
- Easy access.
1:4,200

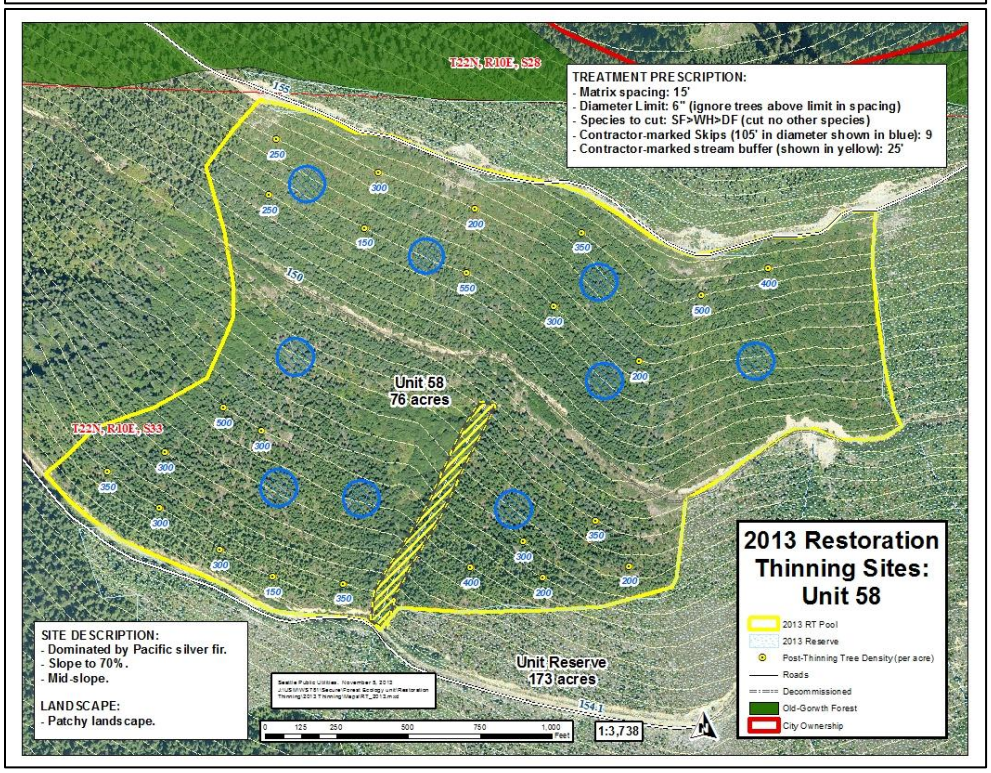
The 150 Road Units:

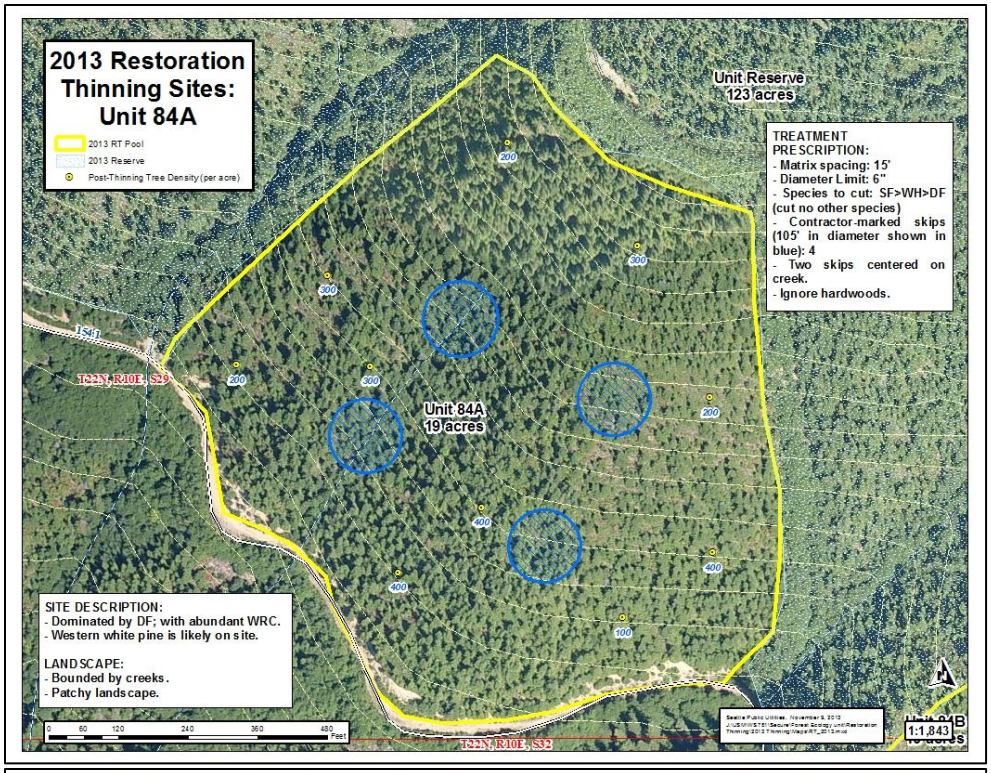


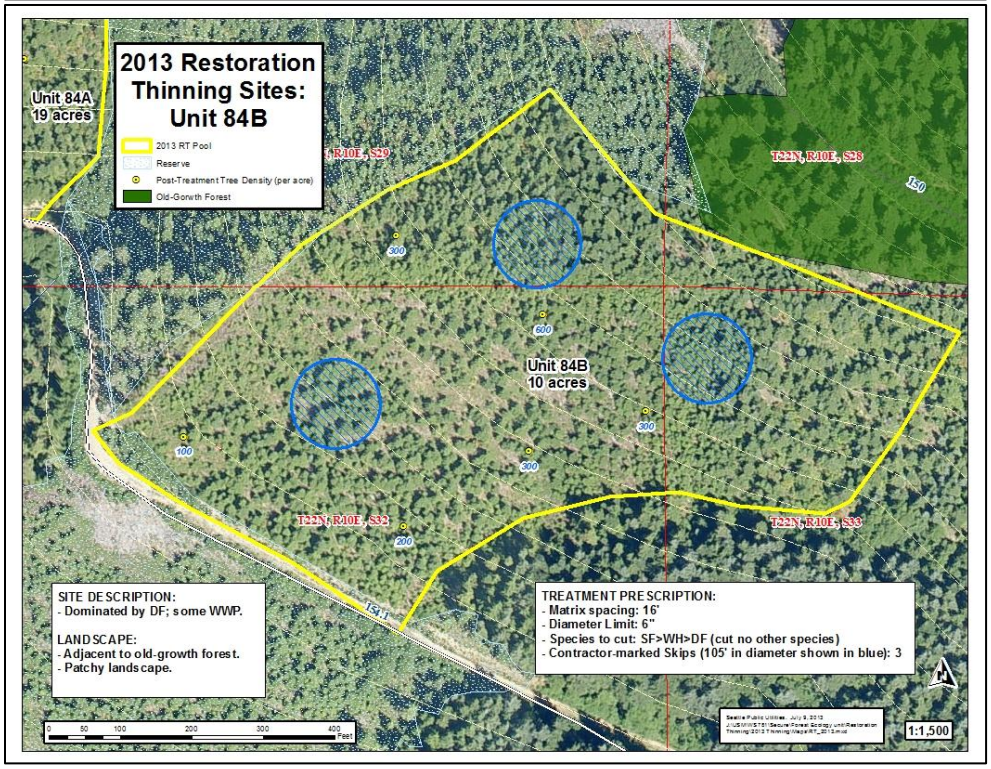

TREATMENT PRESCRIPTION:
- Matrix spacing: 13' (18' around NF, DF, and WWP)
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 2
Unit Reserve
18 acres
Unit Reserve
27 acres
Unit 21.4
14 acres
T22N, R10E, S19
155A
2013 Restoration
Thinning Units:
Unit 21.4
2013 RT Pool
2013 Reserve
Post-Treatment Tree Density (per acre)
Roads
Decommissioned
RT Completed
City Ownership
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- Adjacent to area thinned in 2007 (15' spacing).
- Borders watershed boundary.
- Patchy landscape.
1:1,796

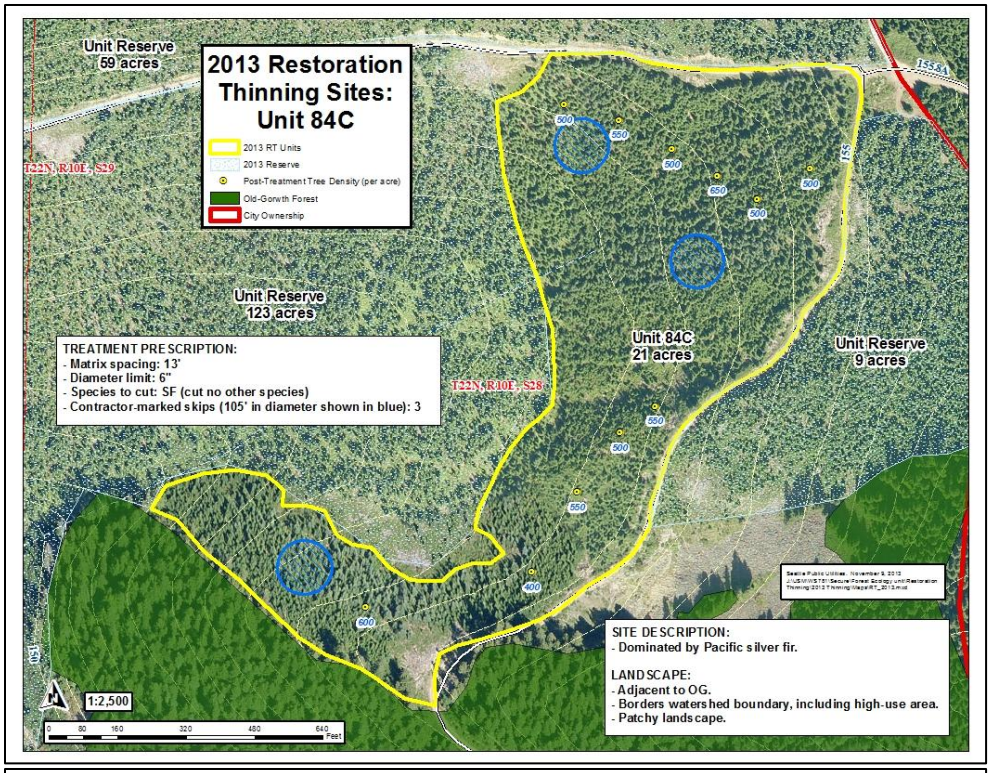

2013 Restoration
Thinning Sites:
Unit 28.2
2013 RT Pool
Reserve
Post-Thinning Tree Density (per acre)
Hiking Trails
Completed RT
Roads
Decommissioned
City Ownership
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter Limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked Skips (105' in diameter shown in blue): 3
- Slash needs to pulled back 10' from the trail.
- Pull slash onto end of 155.5A road.
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- New trail cut mid-slope.
- Mid-slope.
LANDSCAPE:
- Adjacent to watershed boundary.
- Outside of hydrographioc boundary.
- Patchy landscape.
Unit 28.2
17 acres
155.5A
Unit Reserve
41 acres
Unit 85
50 acres
1:2,454

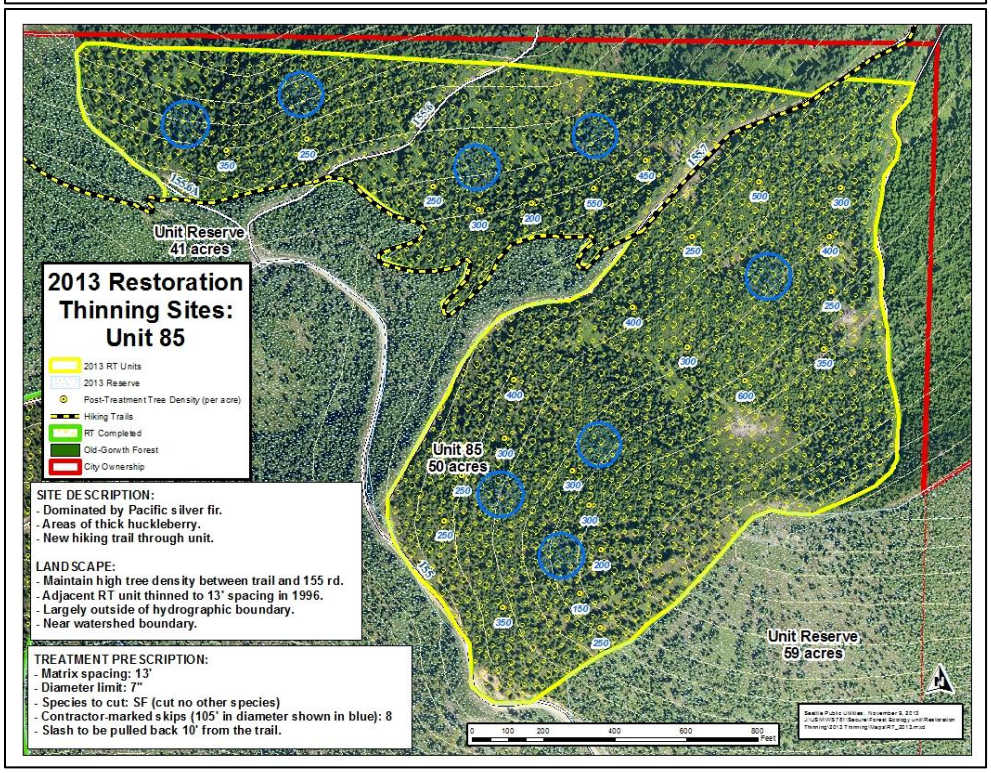

Unit 43
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Thinning Tree Density (per acre)
Old-Growth Forest
City Ownership
Unit Reserve
119 acres
Unit 43
45 acres
SITE DESCRIPTION:
- Heavily dominated by SF.
- Ridgetop.
LANDSCAPE:
- Patchy landscape.
TREATMENT PRESCRIPTION:
- Matrix spacing: 16'
- Diameter limit: 5"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 7
1:3,500
0 140 280 560 840 1,120 Feet


T22N, R10E, S28
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter Limit: 6" (ignore trees above limit in spacing)
- Species to cut: SF>WH>DF (cut no other species)
- Contractor-marked Skips (105' in diameter shown in blue): 9
- Contractor-marked stream buffer (shown in yellow): 25'
Unit 58
76 acres
T22N, R10E, S33
Unit Reserve
173 acres
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- Slope to 70%.
- Mid-slope.
LANDSCAPE:
- Patchy landscape.
2013 Restoration Thinning Sites: Unit 58
2013 RT Pool
2013 Reserve
Post-Thinning Tree Density (per acre)
Roads
Decommissioned
Old-Growth Forest
City Ownership
1:3,738
0 125 250 500 750 1,000 Feet

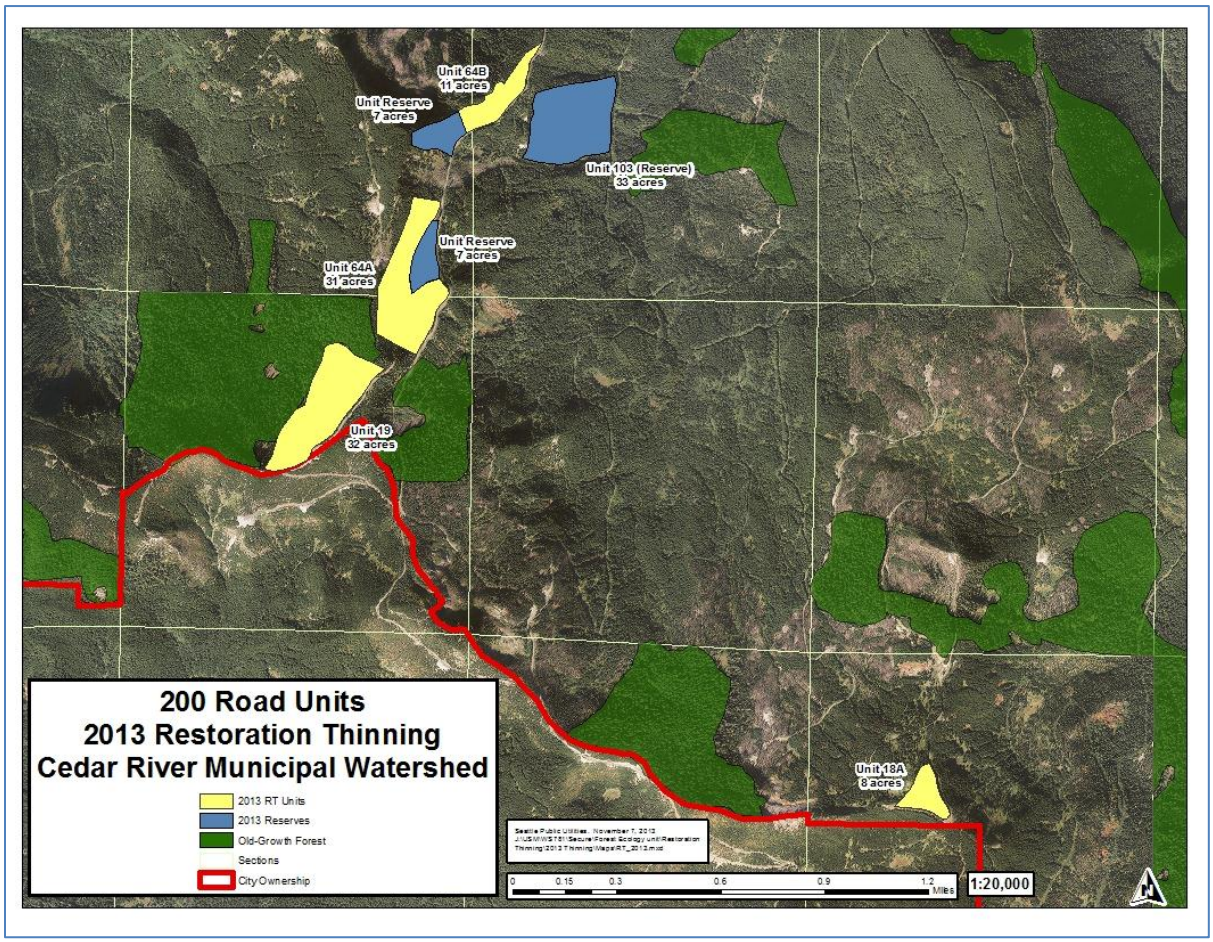

2013 Restoration Thinning Sites: Unit 84A
2013 RT Pool
2013 Reserve
Post-Thinning Tree Density (per acre)
Unit Reserve 123 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter Limit: 6"
- Species to cut: SF>WH>DF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 4
- Two skips centered on creek.
- Ignore hardwoods.
Unit 84A 19 acres
T22N, R10E, S29
T22N, R10E, S32
SITE DESCRIPTION:
- Dominated by DF; with abundant WRC.
- Western white pine is likely on site.
LANDSCAPE:
- Bounded by creeks.
- Patchy landscape.
1:1,843

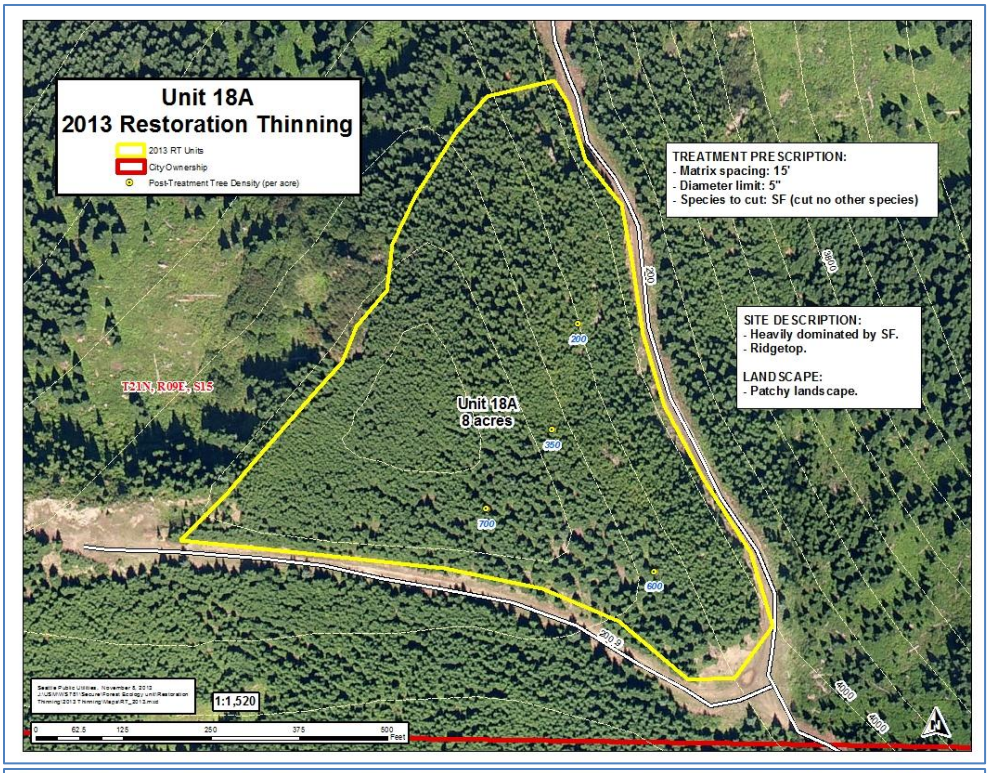

2013 Restoration Thinning Sites: Unit 84B
2013 RT Pool
Reserve
Post-Treatment Tree Density (per acre)
Old-Growth Forest
Unit 84A 19 acres
T22N, R10E, S29
T22N, R10E, S28
T22N, R10E, S32
T22N, R10E, S33
Unit 84B 10 acres
SITE DESCRIPTION:
- Dominated by DF; some WWP.
LANDSCAPE:
- Adjacent to old-growth forest.
- Patchy landscape.
TREATMENT PRESCRIPTION:
- Matrix spacing: 16'
- Diameter Limit: 6"
- Species to cut: SF>WH>DF (cut no other species)
- Contractor-marked Skips (105' in diameter shown in blue): 3
1:1,500

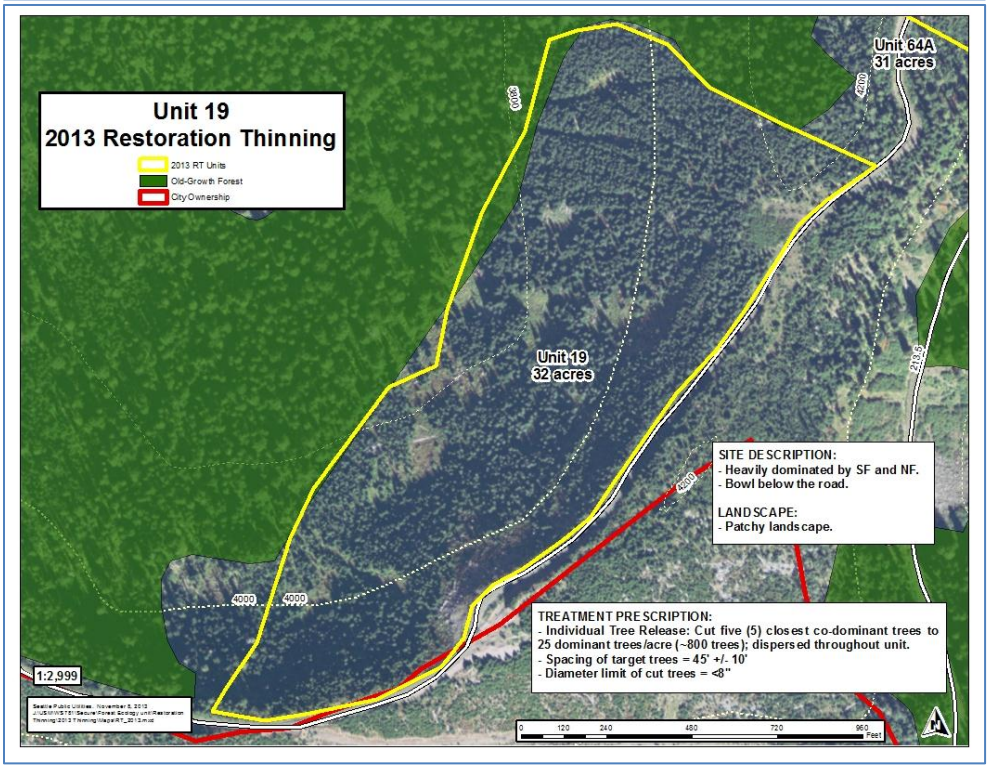

2013 Restoration Thinning Sites: Unit 84C
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Old-Growth Forest
City Ownership
Unit Reserve 59 acres
Unit Reserve 123 acres
Unit 84C 21 acres
Unit Reserve 9 acres
T22N, R10E, S29
T22N, R10E, S28
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 3
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- Adjacent to OG.
- Borders watershed boundary, including high-use area.
- Patchy landscape.
1:2,500
0 80 160 320 480 640 Feet

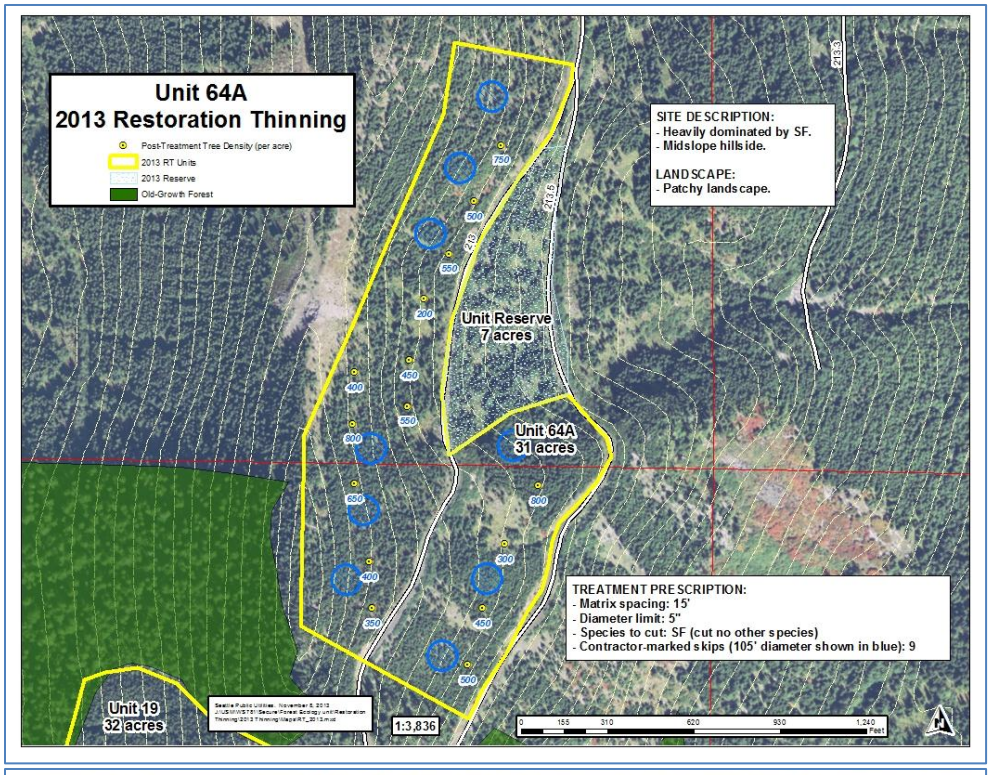

2013 Restoration Thinning Sites: Unit 85
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Hiking Trails
RT Completed
Old-Growth Forest
City Ownership
Unit Reserve 41 acres
Unit 85 50 acres
Unit Reserve 59 acres
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- Areas of thick huckleberry.
- New hiking trail through unit.
LANDSCAPE:
- Maintain high tree density between trail and 155 rd.
- Adjacent RT unit thinned to 13' spacing in 1996.
- Largely outside of hydrographic boundary.
- Near watershed boundary.
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter limit: 7"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 8
- Slash to be pulled back 10' from the trail.
0 100 200 400 600 800 Feet

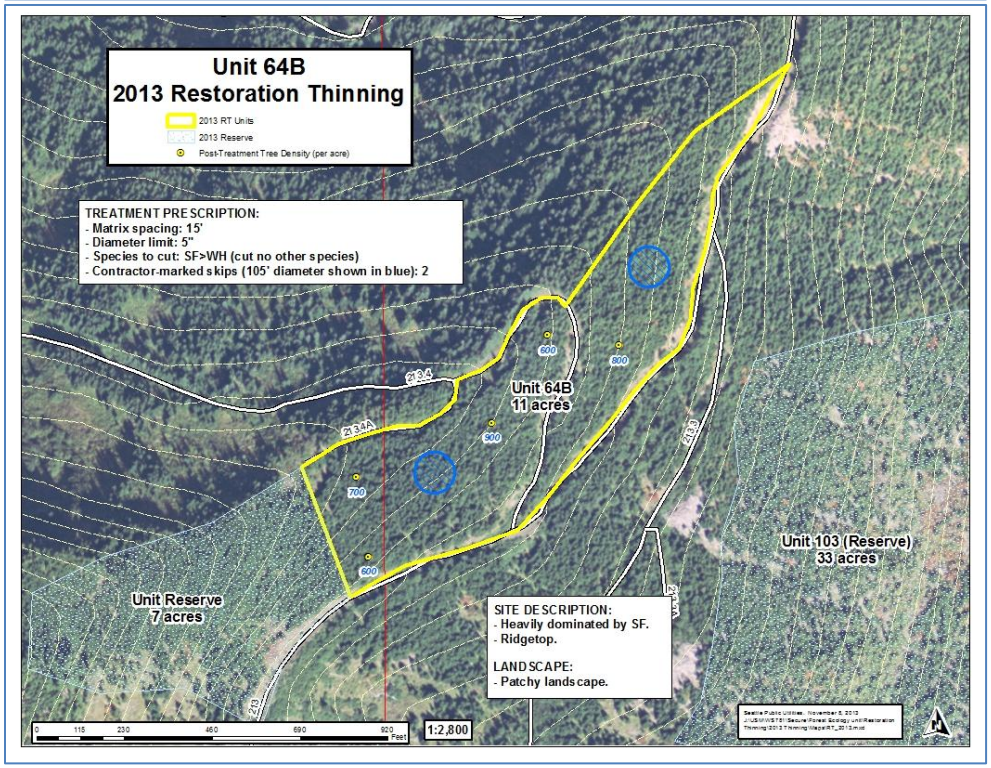
The 200 Road Units:



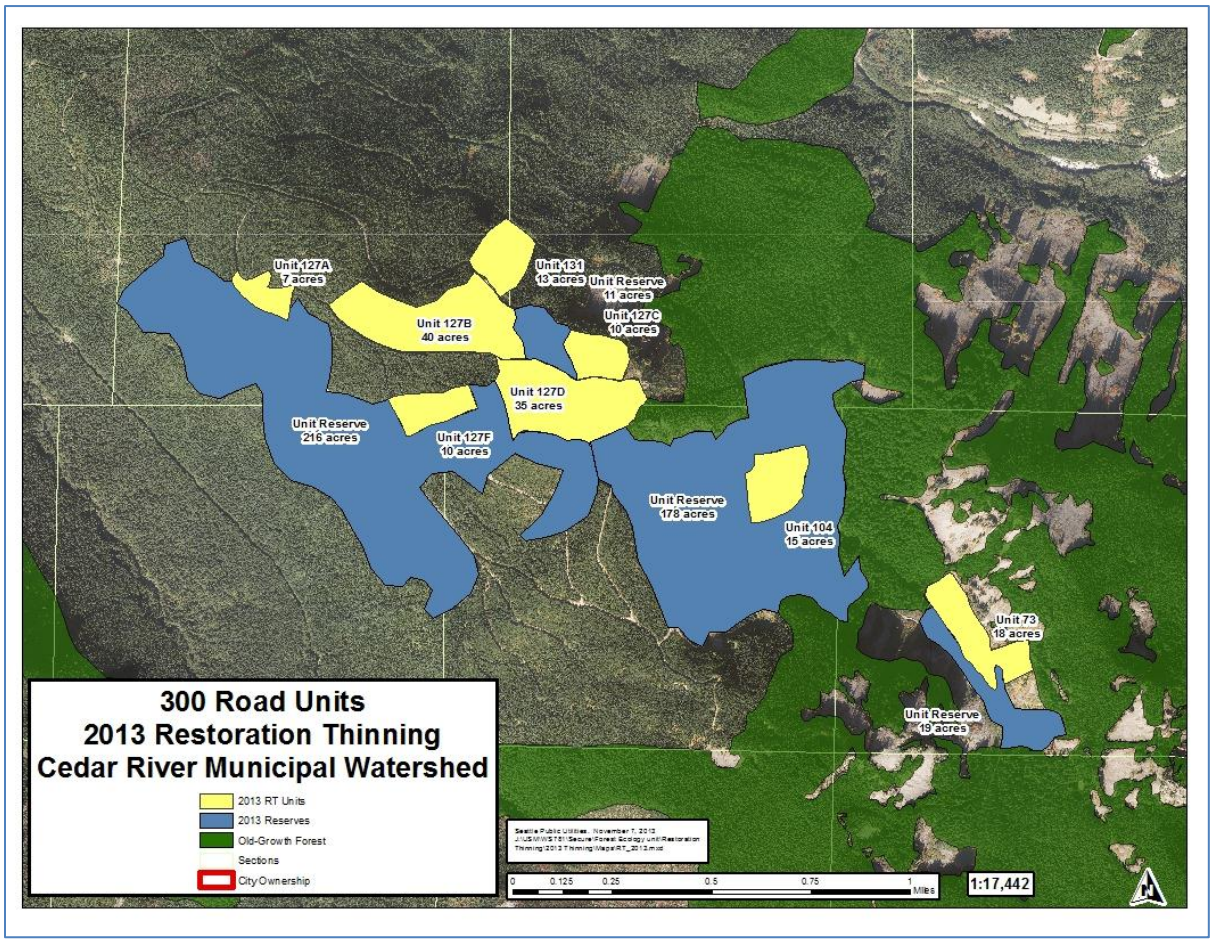

Unit 18A
2013 Restoration Thinning
2013 RT Units
City Ownership
Post-Treatment Tree Density (per acre)
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
SITE DESCRIPTION:
- Heavily dominated by SF.
- Ridgetop.
LANDSCAPE:
- Patchy landscape.
T21N, R09E, S15
Unit 18A
8 acres
1:1,520

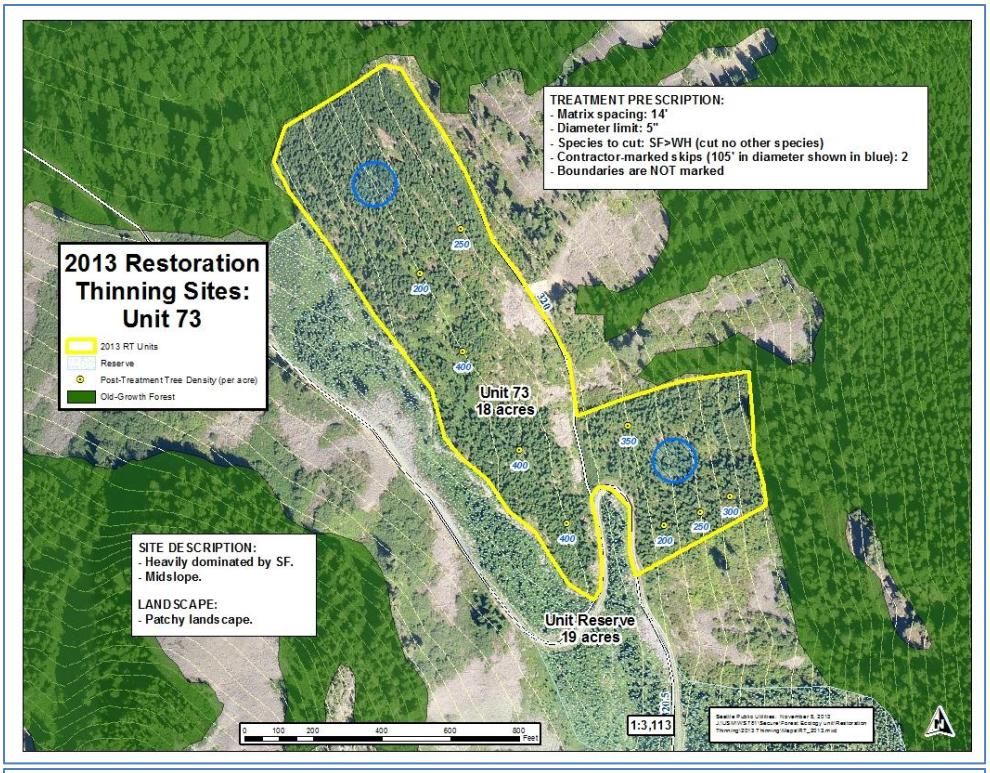

Unit 19
2013 Restoration Thinning
2013 RT Units
Old-Growth Forest
City Ownership
Unit 64A
31 acres
Unit 19
32 acres
SITE DESCRIPTION:
- Heavily dominated by SF and NF.
- Bowl below the road.
LANDSCAPE:
- Patchy landscape.
TREATMENT PRESCRIPTION:
- Individual Tree Release: Cut five (5) closest co-dominant trees to 25 dominant trees/acre (~800 trees); dispersed throughout unit.
- Spacing of target trees = 45' +/- 10'
- Diameter limit of cut trees = <8"
1:2,999

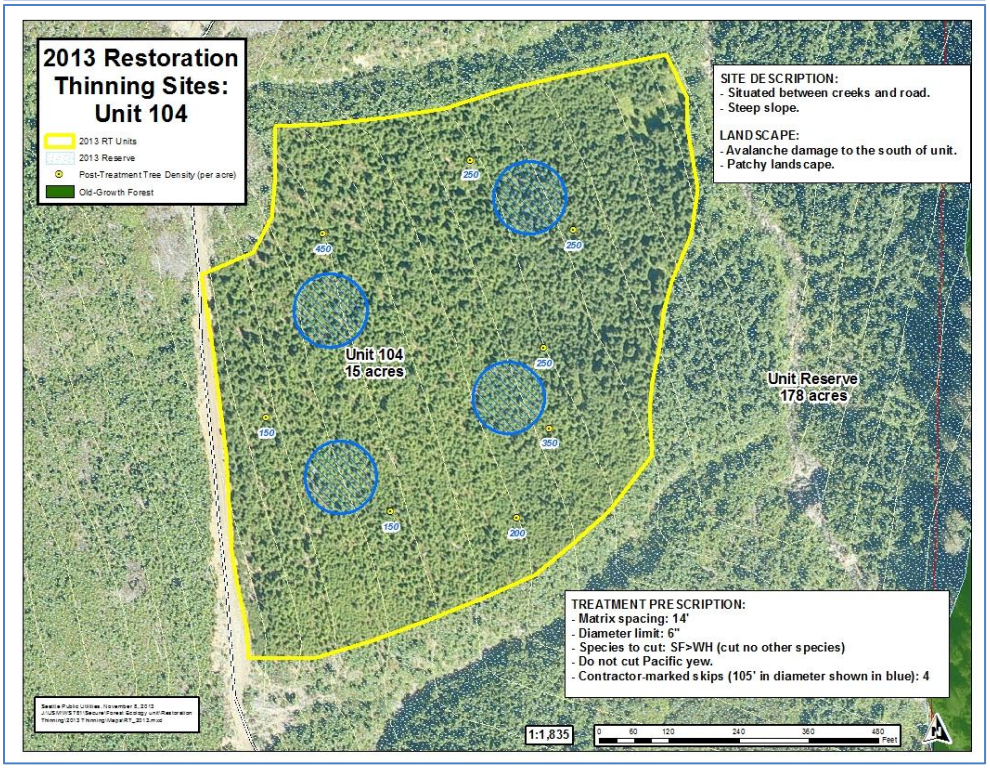

Unit 64A
2013 Restoration Thinning
Post-Treatment Tree Density (per acre)
2013 RT Units
2013 Reserve
Old-Growth Forest
SITE DESCRIPTION:
- Heavily dominated by SF.
- Midslope hillside.
LANDSCAPE:
- Patchy landscape.
Unit Reserve
7 acres
Unit 64A
31 acres
Unit 19
32 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' diameter shown in blue): 9
1:3,836

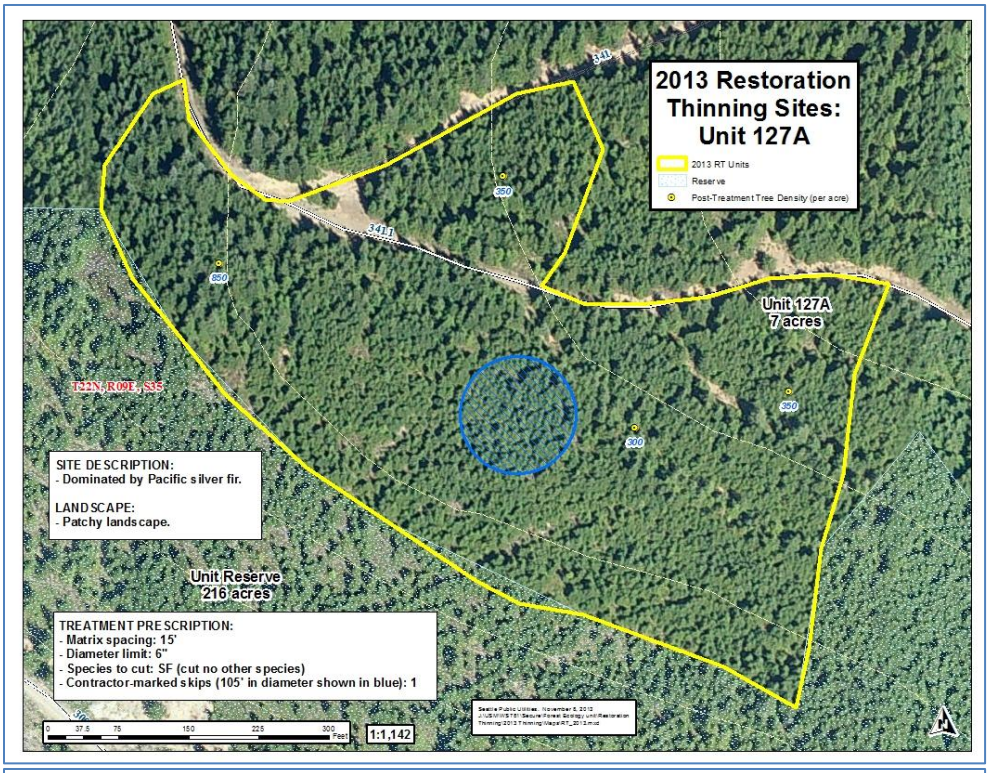

Unit 64B
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' diameter shown in blue): 2
Unit 64B
11 acres
Unit 103 (Reserve)
33 acres
Unit Reserve
7 acres
SITE DESCRIPTION:
- Heavily dominated by SF.
- Ridgetop.
LANDSCAPE:
- Patchy landscape.
1:2,800

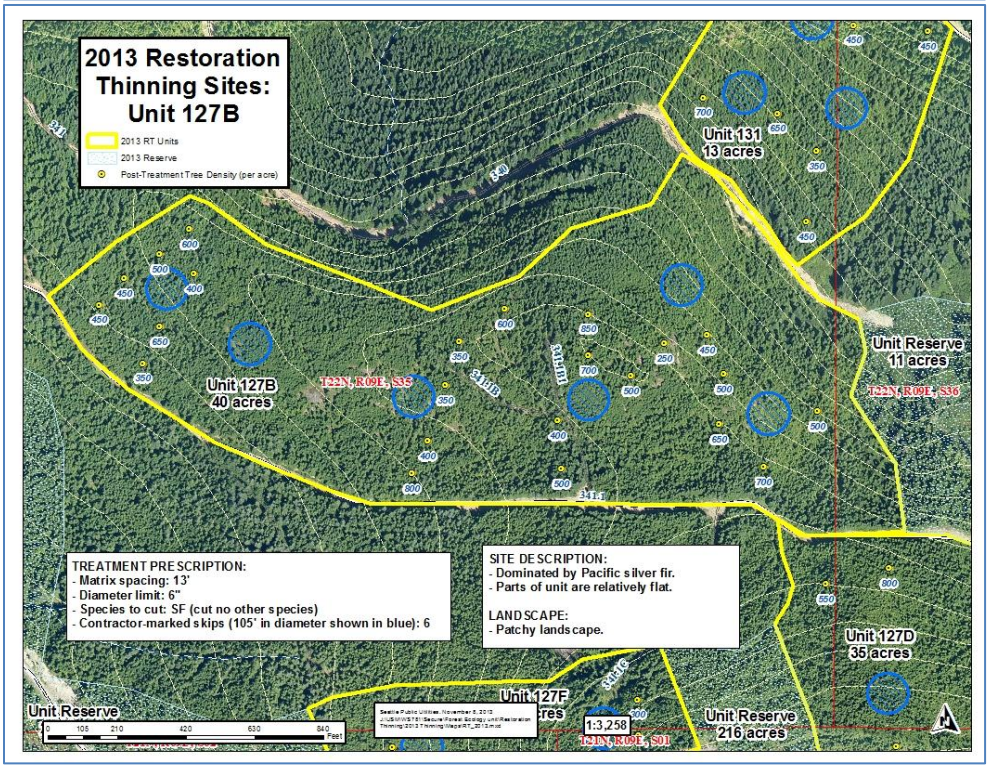
The 300 Road Units:

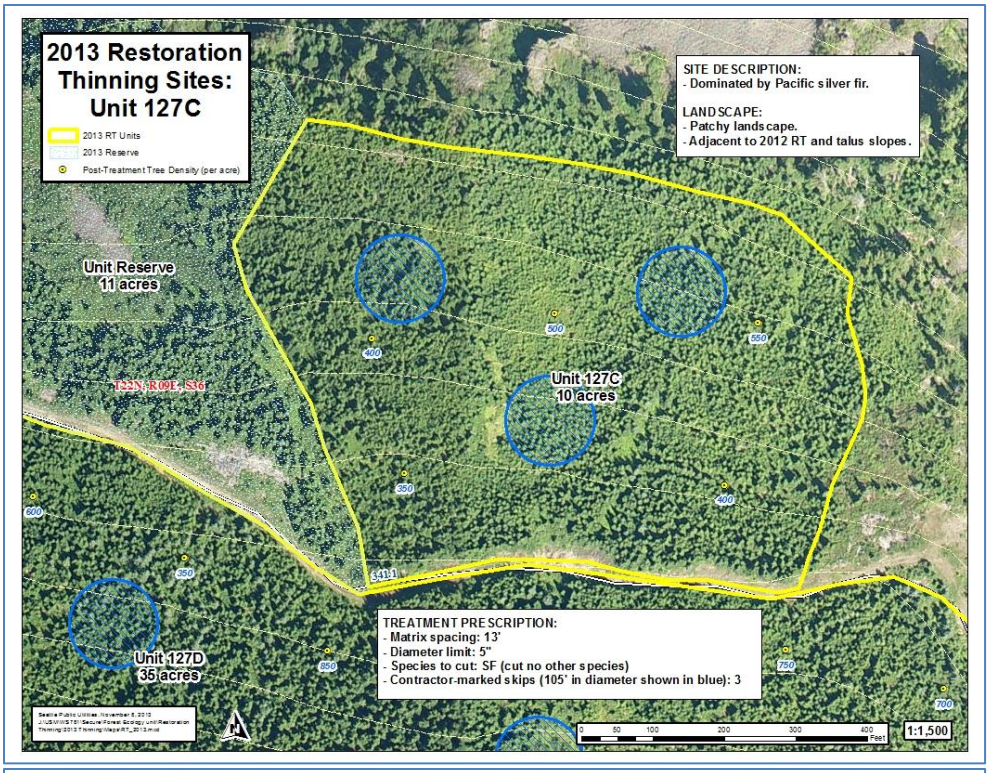


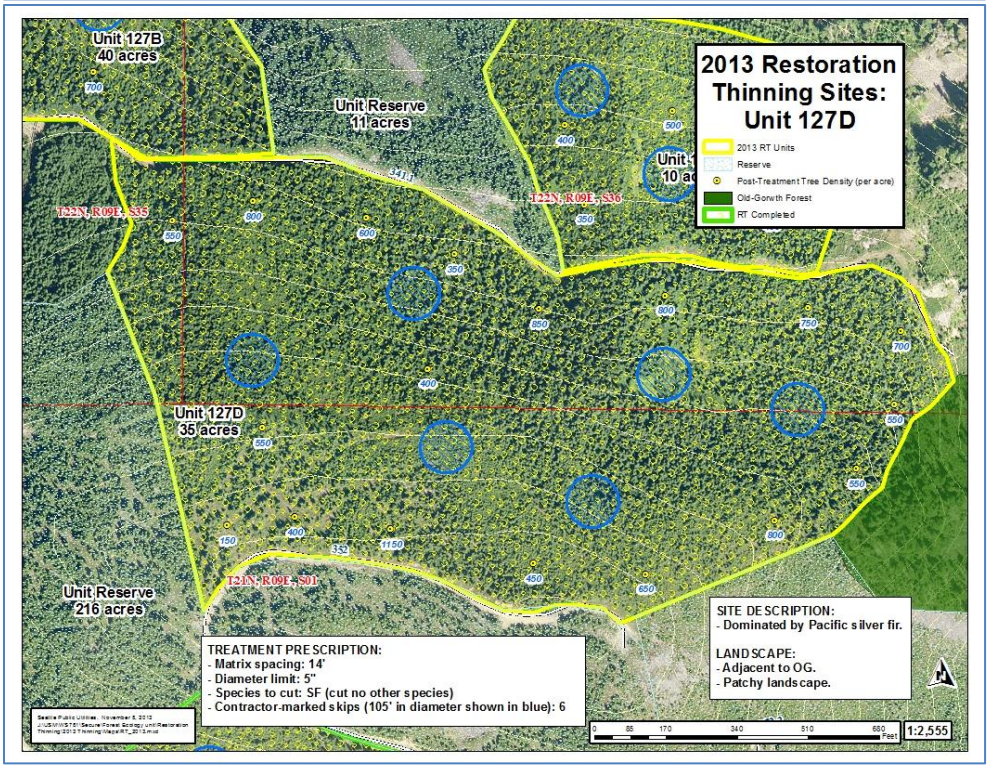

2013 Restoration Thinning Sites: Unit 73
2013 RT Units
Reserve
Post-Treatment Tree Density (per acre)
Old-Growth Forest
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 5"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 2
- Boundaries are NOT marked
SITE DESCRIPTION:
- Heavily dominated by SF.
- Midslope.
LANDSCAPE:
- Patchy landscape.
Unit 73
18 acres
Unit Reserve
19 acres
1:3,113

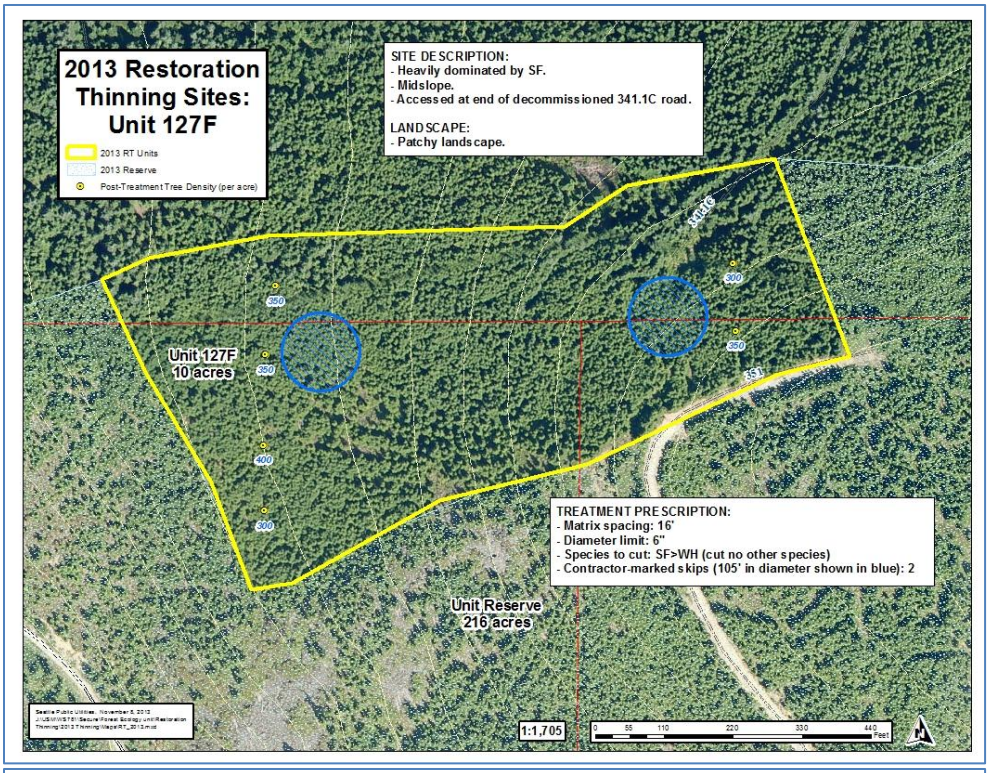

2013 Restoration Thinning Sites: Unit 104
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Old-Growth Forest
SITE DESCRIPTION:
- Situated between creeks and road.
- Steep slope.
LANDSCAPE:
- Avalanche damage to the south of unit.
- Patchy landscape.
Unit 104
15 acres
Unit Reserve
178 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 6"
- Species to cut: SF>WH (cut no other species)
- Do not cut Pacific yew.
- Contractor-marked skips (105' in diameter shown in blue): 4
1:1,835

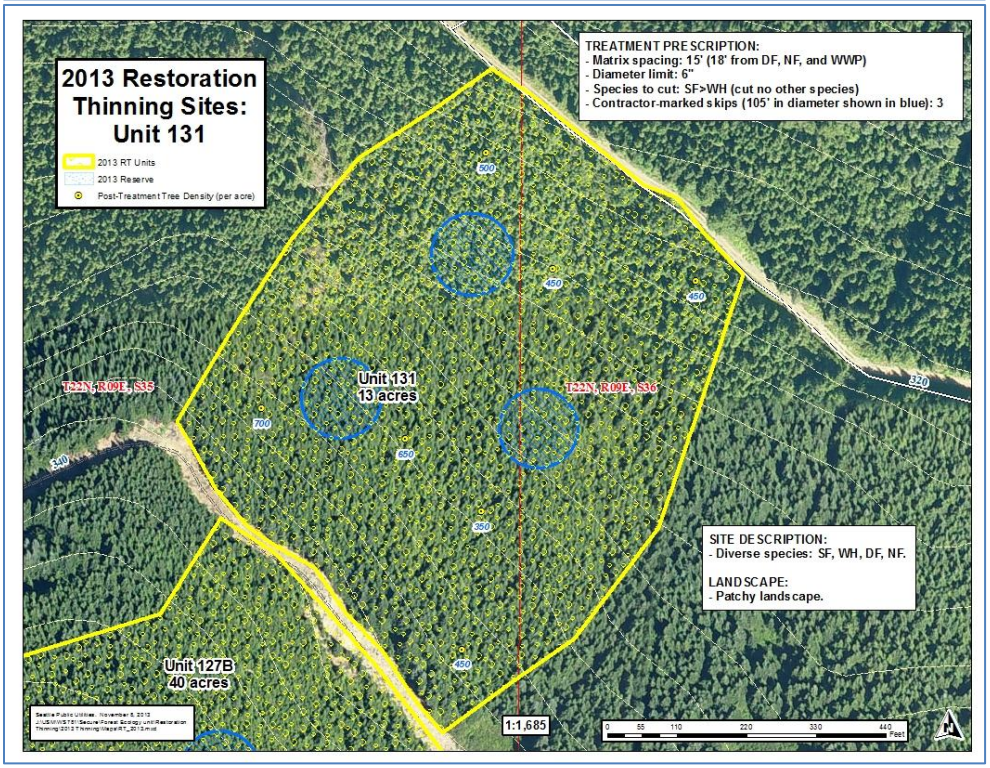

2013 Restoration Thinning Sites: Unit 127A
2013 RT Units
Reserve
Post-Treatment Tree Density (per acre)
Unit 127A 7 acres
T22N, R09E, S35
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- Patchy landscape.
Unit Reserve 216 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 1
1:1,142


2013 Restoration Thinning Sites: Unit 127B
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Unit 131 13 acres
Unit Reserve 11 acres
T22N, R09E, S36
Unit 127B 40 acres
T22N, R09E, S35
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 6
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- Parts of unit are relatively flat.
LANDSCAPE:
- Patchy landscape.
Unit 127D 35 acres
Unit 127F
Unit Reserve 216 acres
T21N, R09E, S01
1:3,258

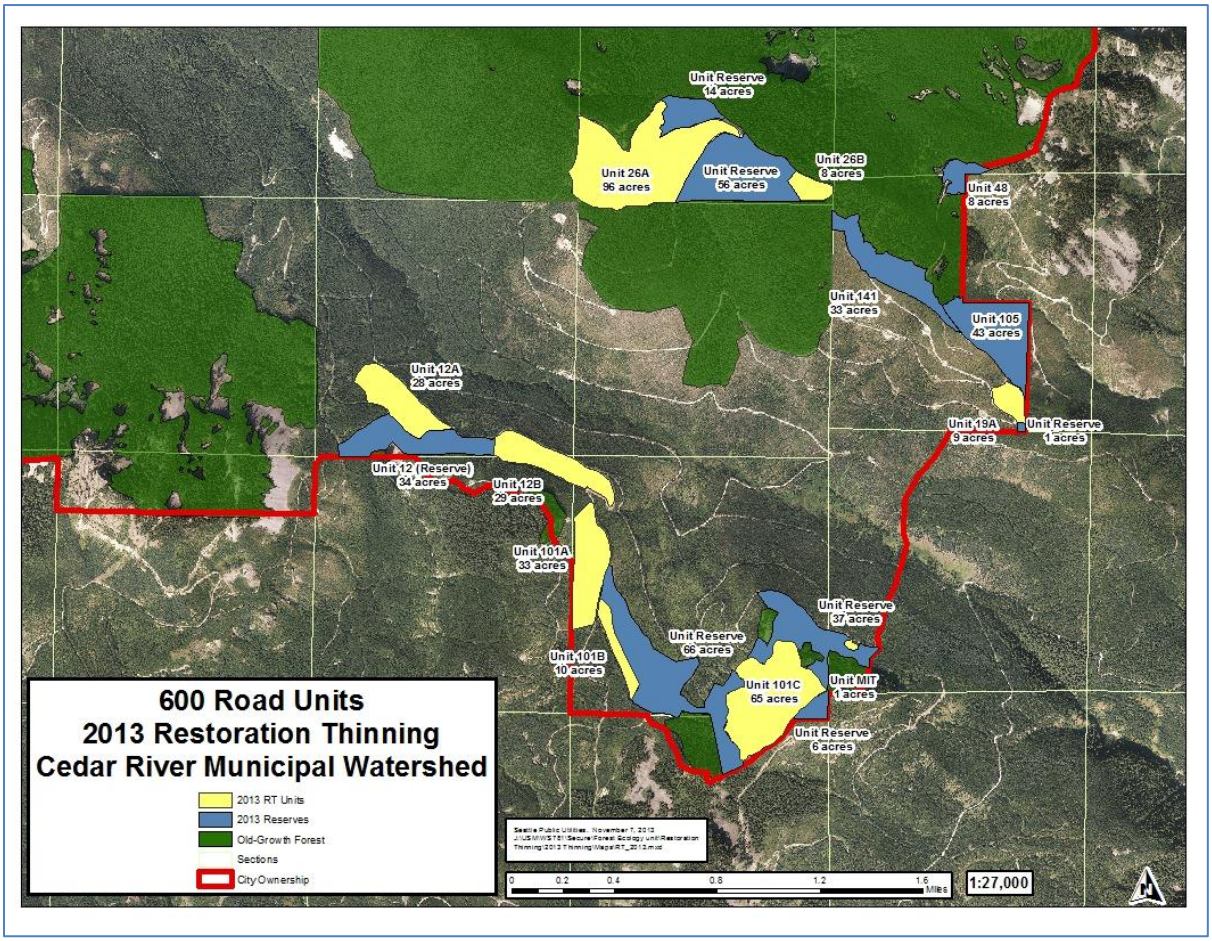

2013 Restoration Thinning Sites: Unit 127C
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- Patchy landscape.
- Adjacent to 2012 RT and talus slopes.
Unit Reserve 11 acres
T22N - R09E - S36
Unit 127C 10 acres
Unit 127D 35 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 3
1:1,500

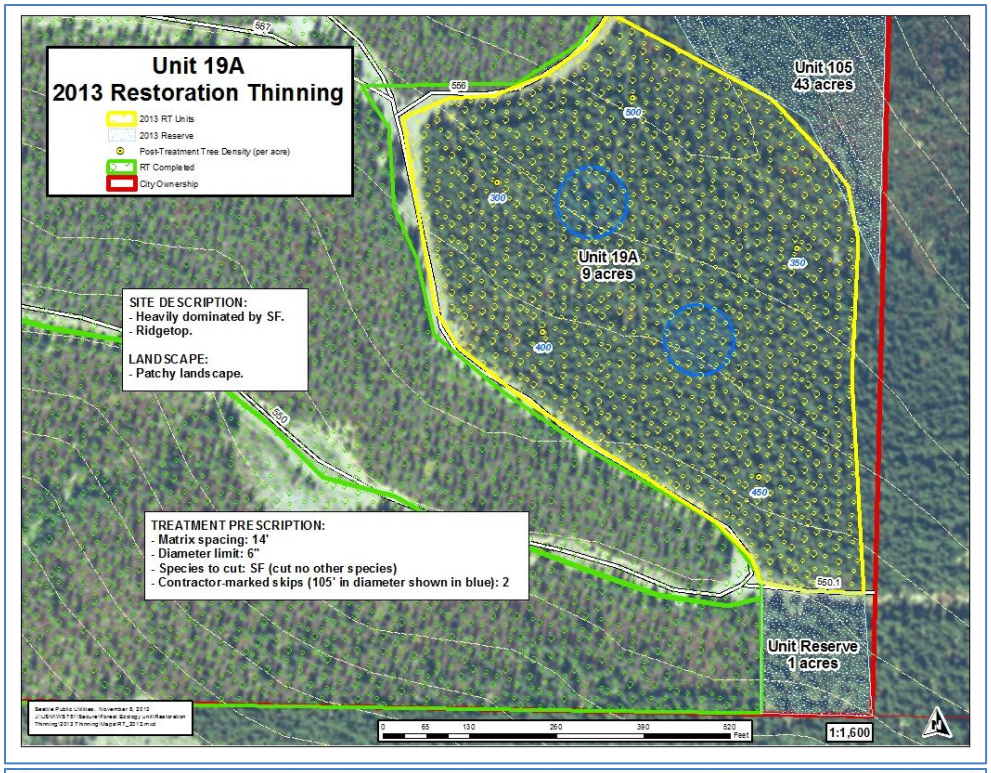

Unit 127B 40 acres
Unit Reserve 11 acres
2013 Restoration Thinning Sites: Unit 127D
2013 RT Units
Reserve
Post-Treatment Tree Density (per acre)
Old-Growth Forest
RT Completed
T22N - R09E - S35
T22N - R09E - S36
Unit 127D 35 acres
Unit Reserve 216 acres
T21N - R09E - S01
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 6
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- Adjacent to OG.
- Patchy landscape.
1:2,555

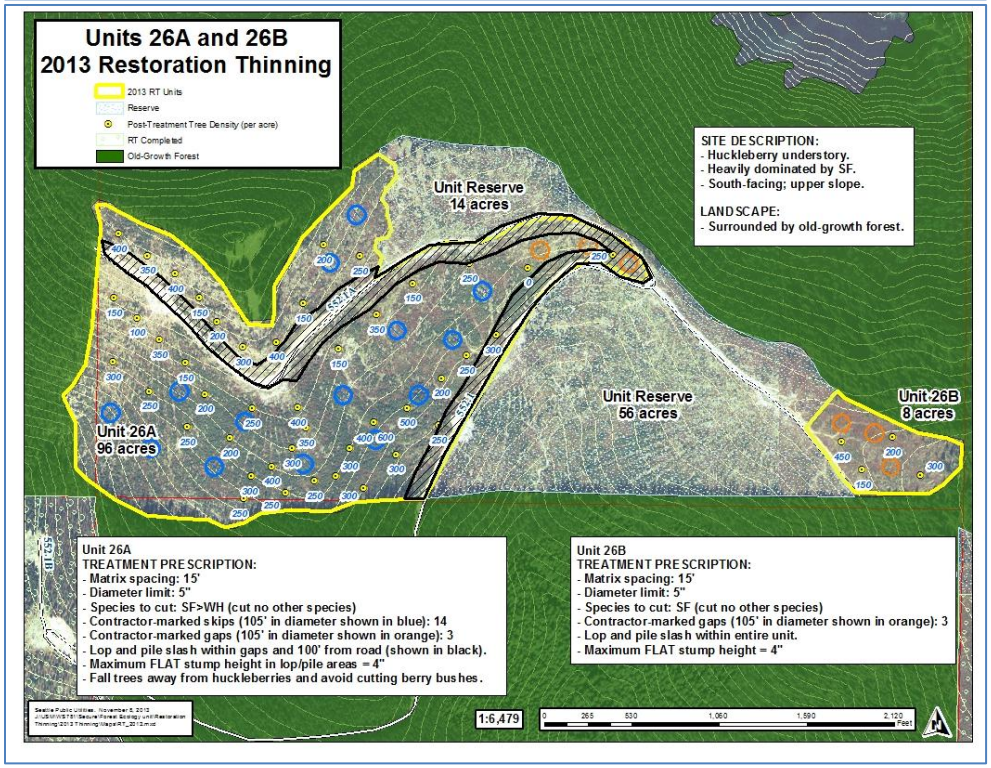

2013 Restoration Thinning Sites: Unit 127F
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
SITE DESCRIPTION:
- Heavily dominated by SF.
- Midslope.
- Accessed at end of decommissioned 341.1C road.
LANDSCAPE:
- Patchy landscape.
Unit 127F
10 acres
Unit Reserve
216 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 16'
- Diameter limit: 6"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 2
1:1,705

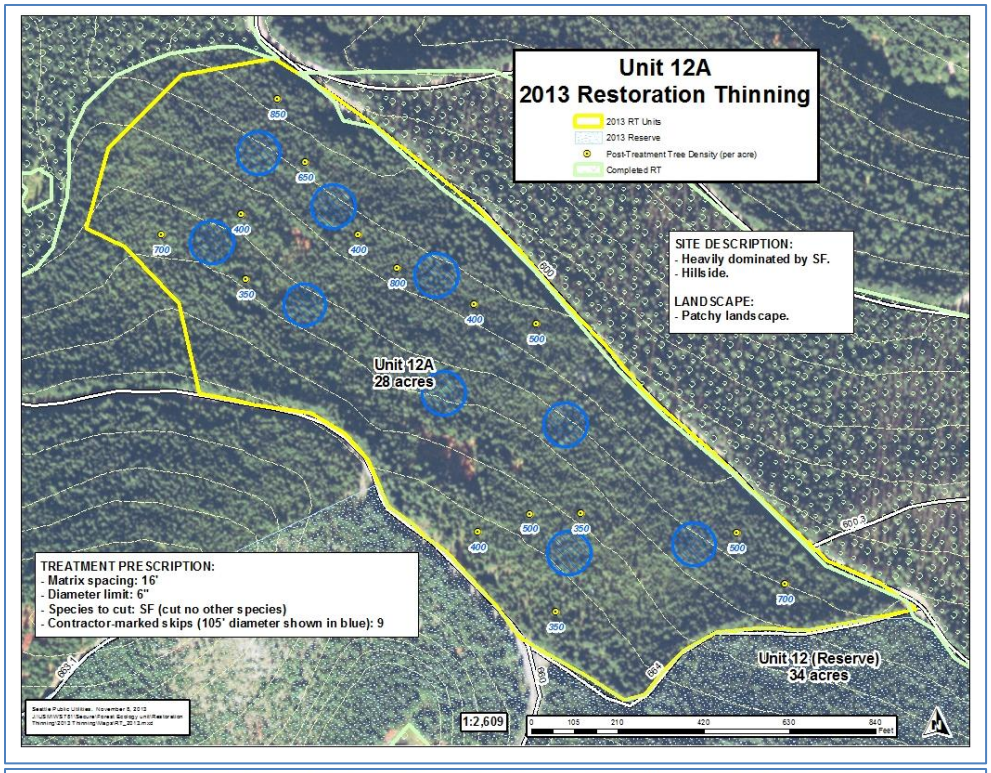

2013 Restoration Thinning Sites: Unit 131
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
TREATMENT PRESCRIPTION:
- Matrix spacing: 15' (18' from DF, NF, and WWP)
- Diameter limit: 6"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 3
Unit 131
13 acres
T22N, R09E, S35
T22N, R09E, S36
SITE DESCRIPTION:
- Diverse species: SF, WH, DF, NF.
LANDSCAPE:
- Patchy landscape.
Unit 127B
40 acres
1:1,685

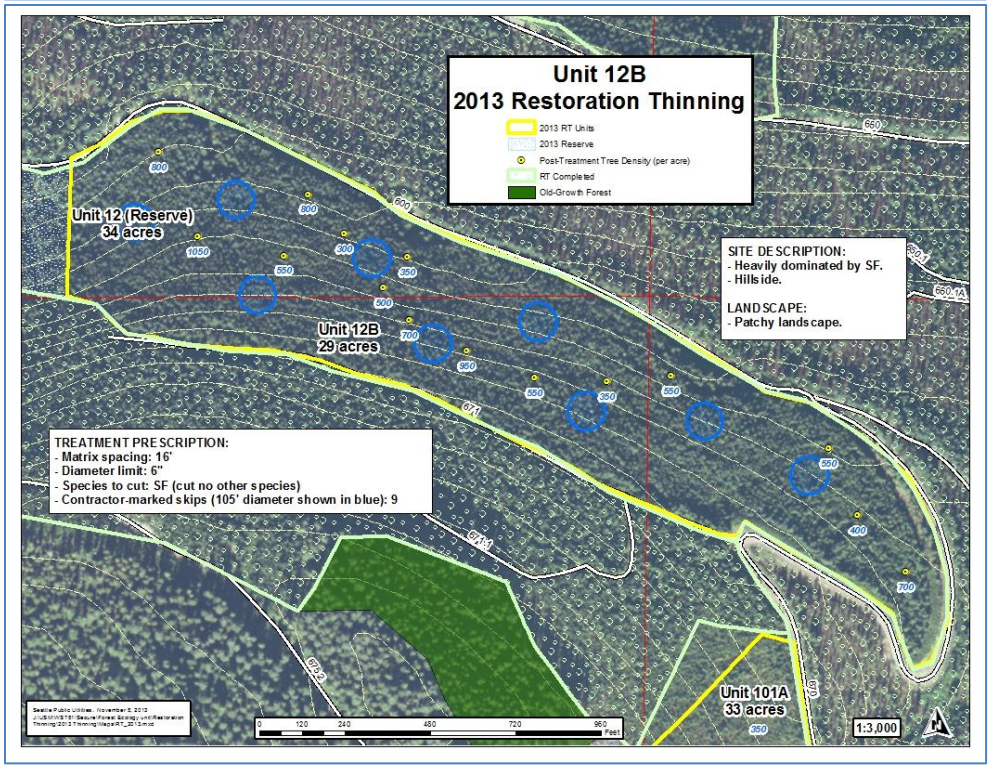
The 550 and 600 Road Units:

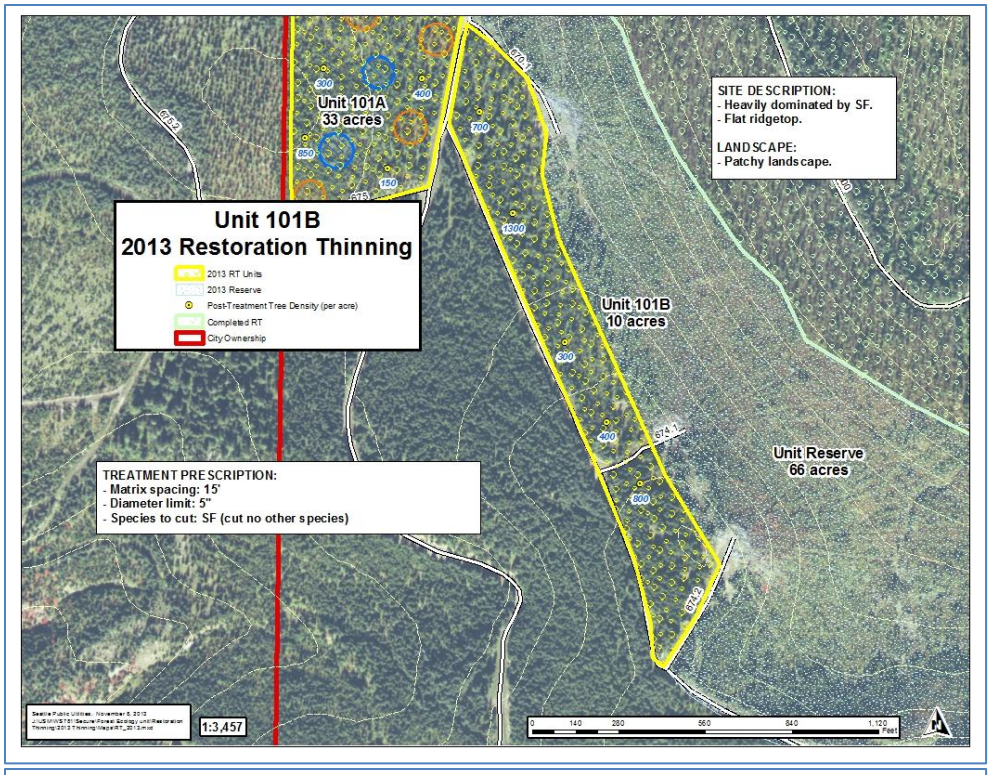


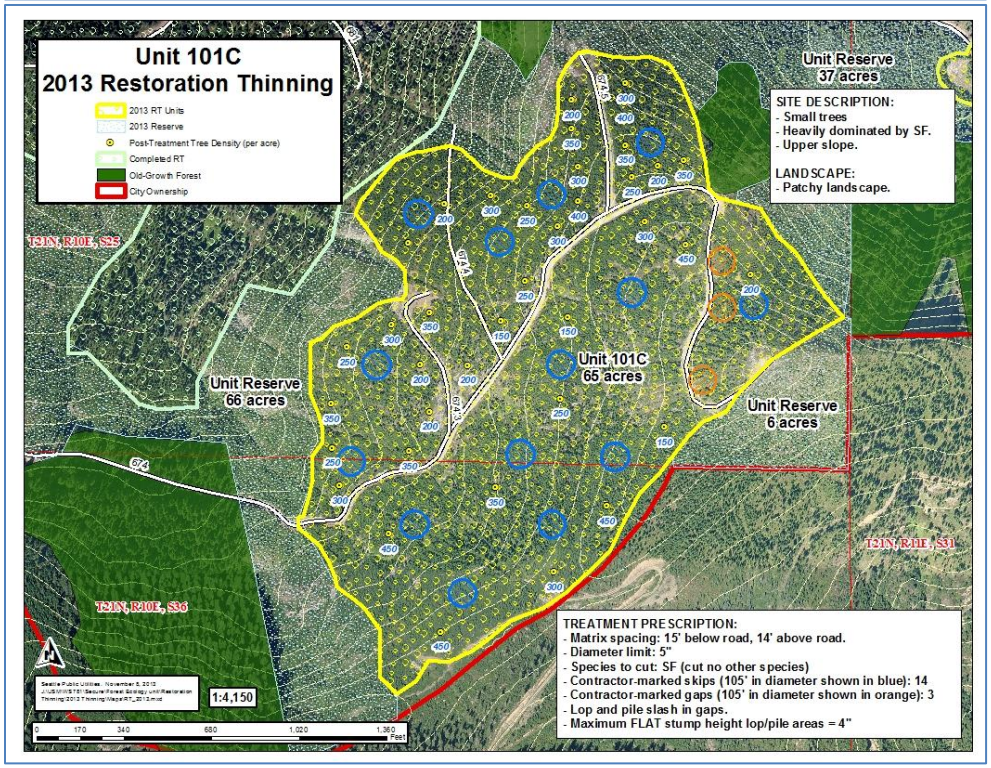

Unit 19A
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
RT Completed
City Ownership
Unit 105
43 acres
Unit 19A
9 acres
Unit Reserve
1 acres
SITE DESCRIPTION:
- Heavily dominated by SF.
- Ridgetop.
LANDSCAPE:
- Patchy landscape.
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 2
1:1,600

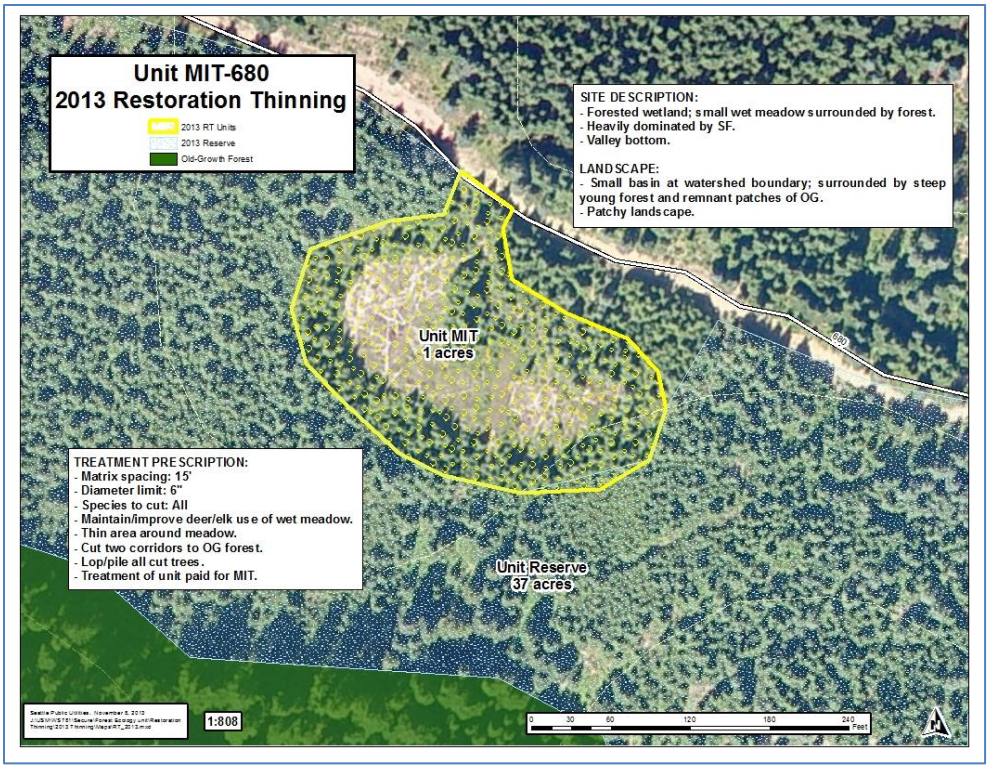

Units 26A and 26B
2013 Restoration Thinning
2013 RT Units
Reserve
Post-Treatment Tree Density (per acre)
RT Completed
Old-Growth Forest
Unit Reserve
14 acres
Unit Reserve
56 acres
Unit 26A
96 acres
Unit 26B
8 acres
SITE DESCRIPTION:
- Huckleberry understory.
- Heavily dominated by SF.
- South-facing; upper slope.
LANDSCAPE:
- Surrounded by old-growth forest.
Unit 26A
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 14
- Contractor-marked gaps (105' in diameter shown in orange): 3
- Lop and pile slash within gaps and 100' from road (shown in black).
- Maximum FLAT stump height in lop/pile areas = 4"
- Fall trees away from huckleberries and avoid cutting berry bushes.
Unit 26B
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked gaps (105' in diameter shown in orange): 3
- Lop and pile slash within entire unit.
- Maximum FLAT stump height = 4"
1:6,479


Unit 12A
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Completed RT
SITE DESCRIPTION:
- Heavily dominated by SF.
- Hillside.
LANDSCAPE:
- Patchy landscape.
Unit 12A
28 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 16'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' diameter shown in blue): 9
Unit 12 (Reserve)
34 acres
1:2,609
0 105 210 420 630 840
Feet

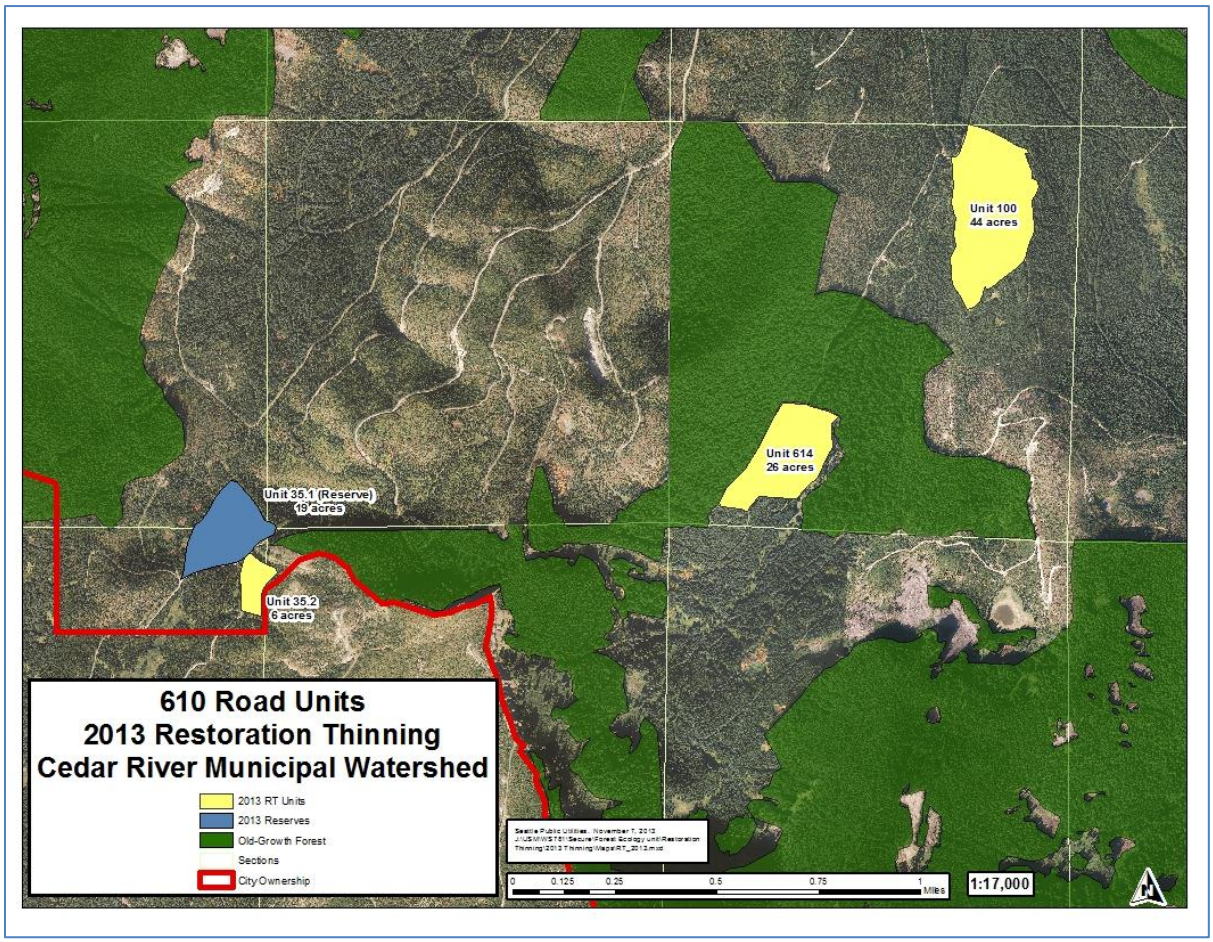

Unit 12B
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
RT Completed
Old-Growth Forest
Unit 12 (Reserve)
34 acres
SITE DESCRIPTION:
- Heavily dominated by SF.
- Hillside.
LANDSCAPE:
- Patchy landscape.
Unit 12B
29 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 16'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' diameter shown in blue): 9
Unit 101A
33 acres
1:3,000
0 120 240 480 720 960
Feet

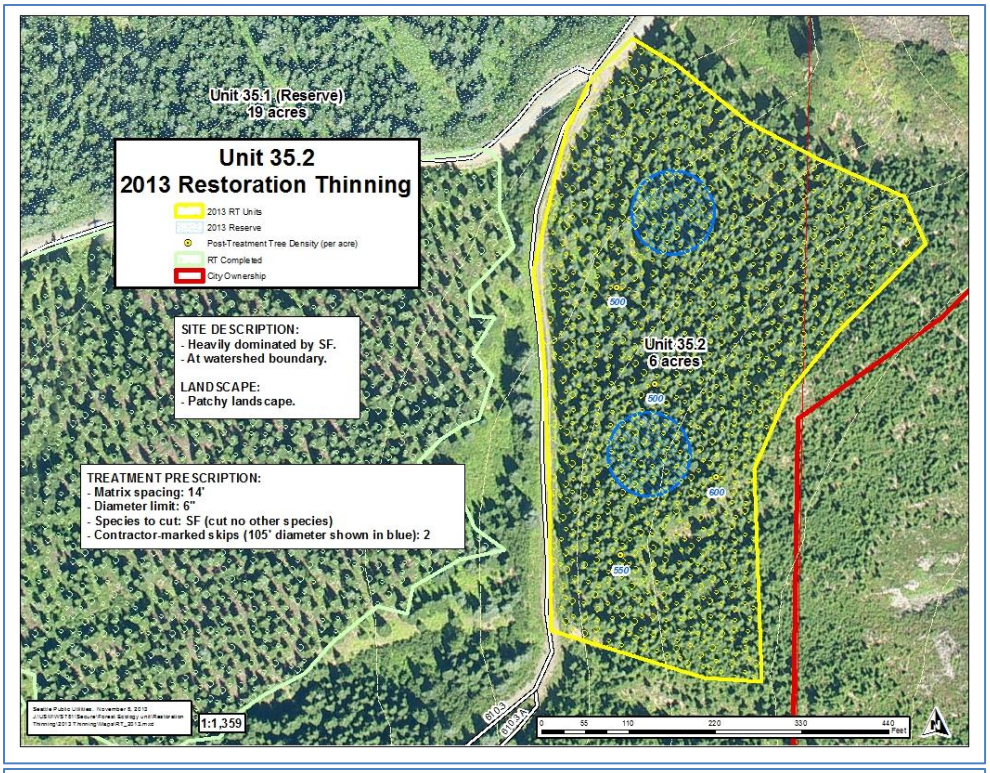

Unit 101B
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Completed RT
City Ownership
Unit 101A
33 acres
Unit 101B
10 acres
Unit Reserve
66 acres
SITE DESCRIPTION:
- Heavily dominated by SF.
- Flat ridgetop.
LANDSCAPE:
- Patchy landscape.
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
1:3,457

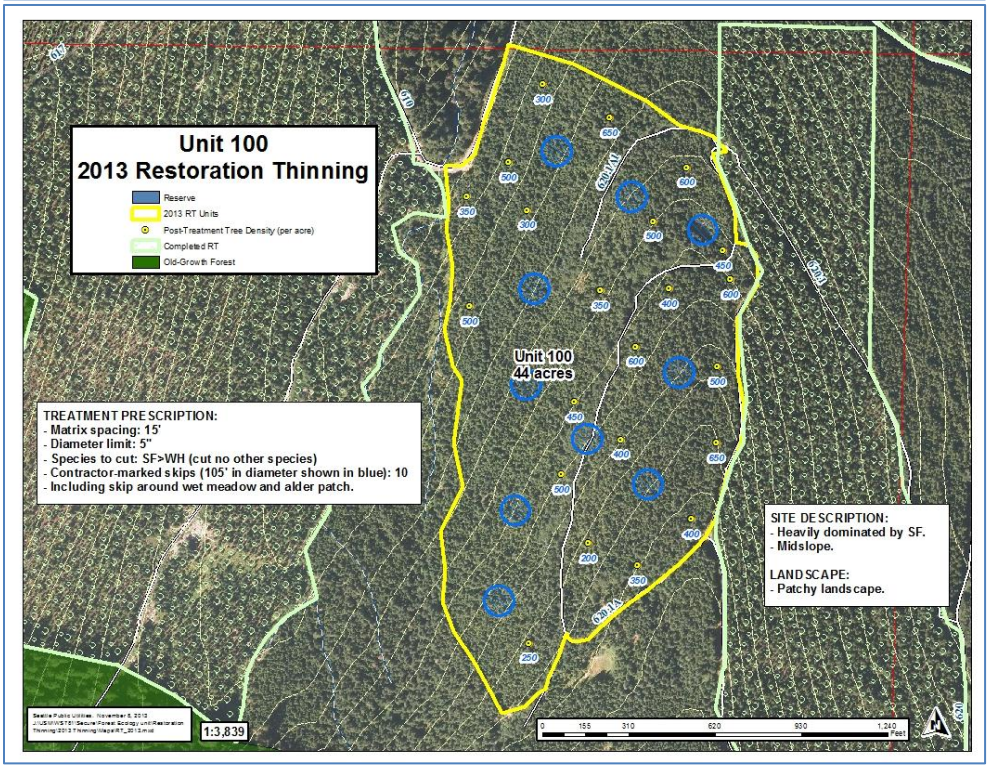

Unit 101C
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Completed RT
Old-Growth Forest
City Ownership
Unit Reserve
37 acres
SITE DESCRIPTION:
- Small trees
- Heavily dominated by SF.
- Upper slope.
LANDSCAPE:
- Patchy landscape.
T21N, R10E, S25
Unit Reserve
66 acres
Unit 101C
65 acres
Unit Reserve
6 acres
T21N, R11E, S31
T21N, R10E, S36
TREATMENT PRESCRIPTION:
- Matrix spacing: 15' below road, 14' above road.
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 14
- Contractor-marked gaps (105' in diameter shown in orange): 3
- Lop and pile slash in gaps.
- Maximum FLAT stump height lop/pile areas = 4"
1:4,150

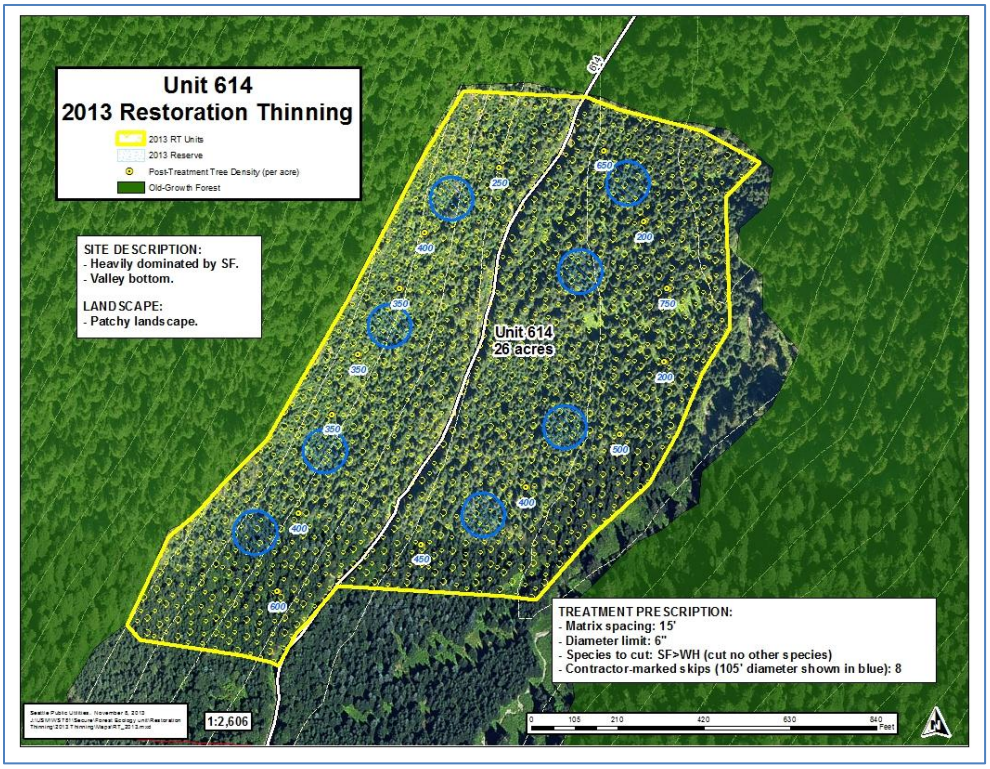

Unit MIT-680
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Old-Growth Forest
SITE DESCRIPTION:
- Forested wetland; small wet meadow surrounded by forest.
- Heavily dominated by SF.
- Valley bottom.
LANDSCAPE:
- Small basin at watershed boundary; surrounded by steep young forest and remnant patches of OG.
- Patchy landscape.
Unit MIT
1 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 6"
- Species to cut: All
- Maintain/improve deer/elk use of wet meadow.
- Thin area around meadow.
- Cut two corridors to OG forest.
- Lop/pile all cut trees.
- Treatment of unit paid for MIT.
Unit Reserve
37 acres
1:808
0 30 60 120 180 240
Feet

The 610 Road Units:

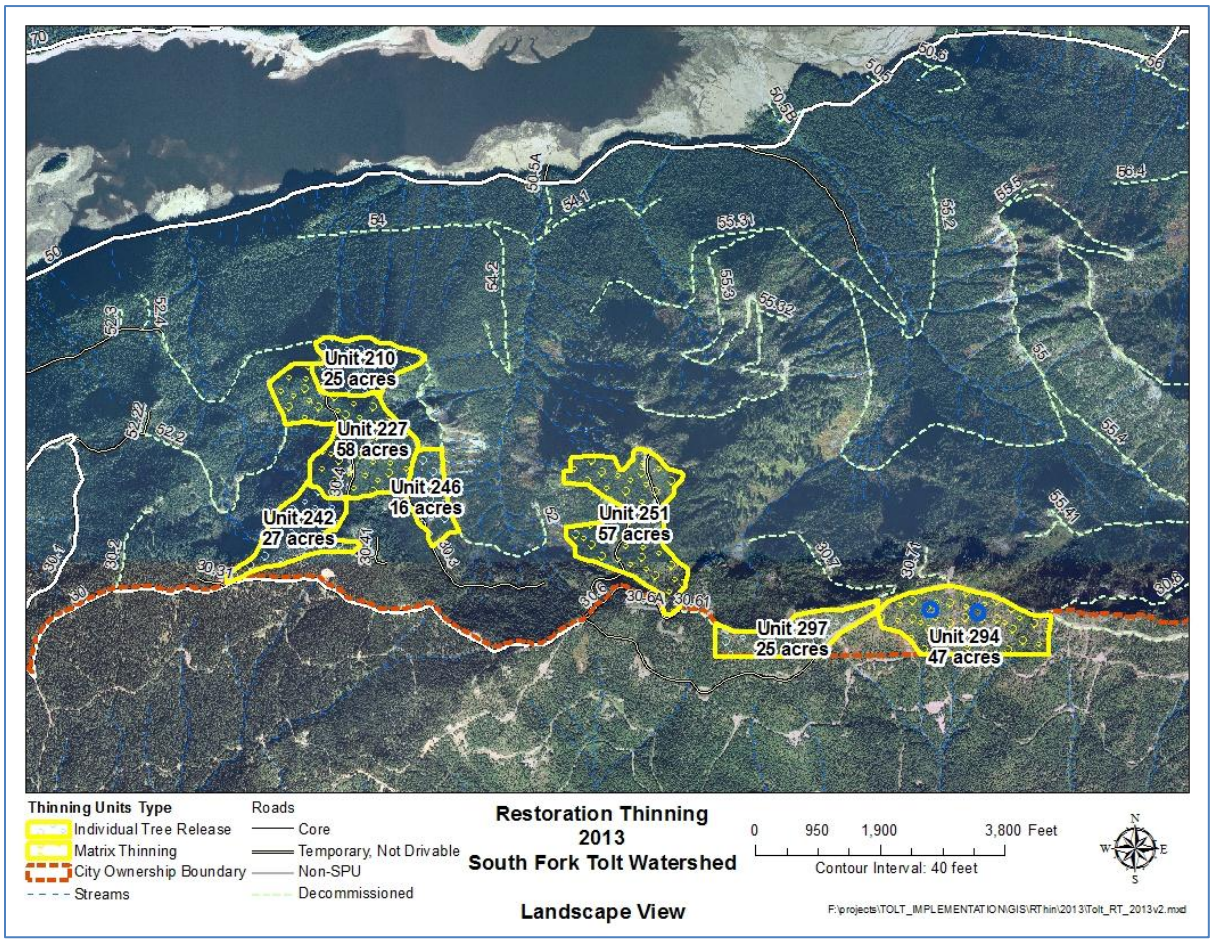


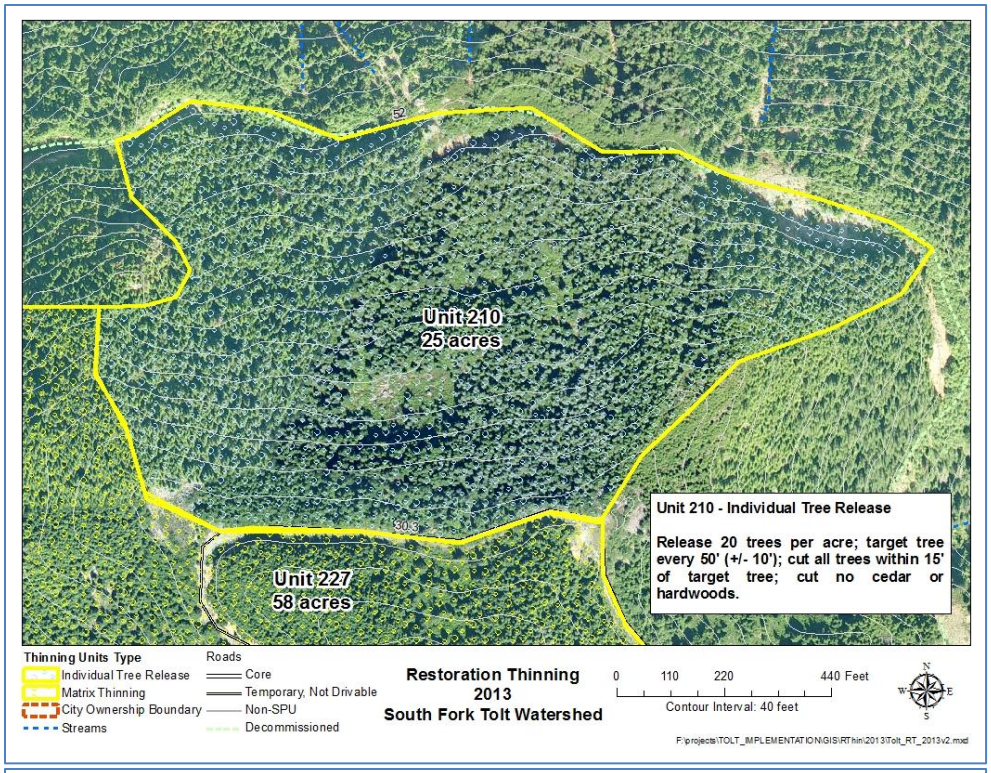

Unit 35.1 (Reserve)
19 acres
Unit 35.2
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
RT Completed
City Ownership
SITE DESCRIPTION:
- Heavily dominated by SF.
- At watershed boundary.
LANDSCAPE:
- Patchy landscape.
Unit 35.2
6 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' diameter shown in blue): 2
1:1,359
0 55 110 220 330 440
Feet

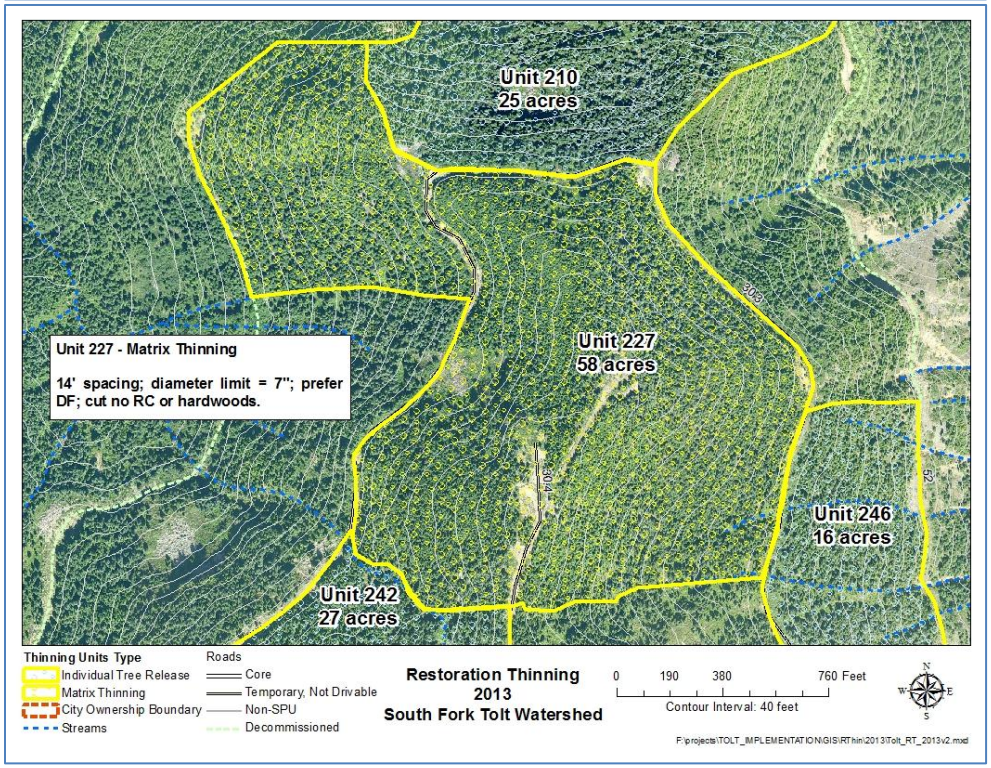

Unit 100
2013 Restoration Thinning
Reserve
2013 RT Units
Post-Treatment Tree Density (per acre)
Completed RT
Old-Growth Forest
Unit 100
44 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 5"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 10
- Including skip around wet meadow and alder patch.
SITE DESCRIPTION:
- Heavily dominated by SF.
- Midslope.
LANDSCAPE:
- Patchy landscape.
1:3,839
0 155 310 620 930 1,240
Feet

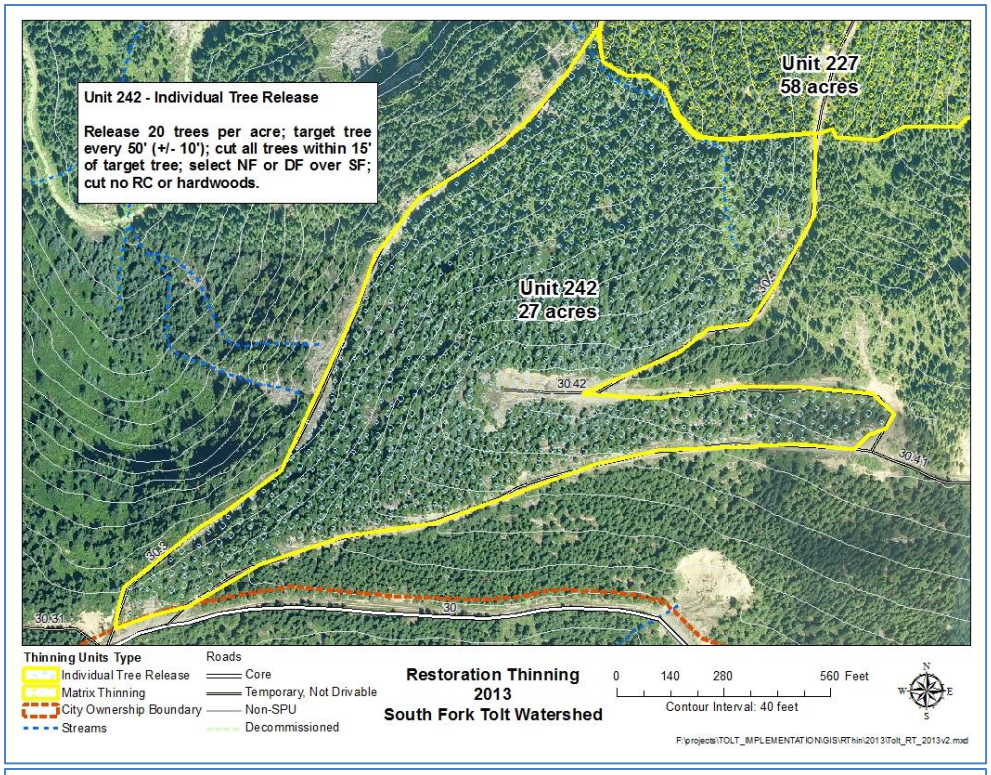

Unit 614
2013 Restoration Thinning
2013 RT Units
2013 Reserve
Post-Treatment Tree Density (per acre)
Old-Growth Forest
SITE DESCRIPTION:
- Heavily dominated by SF.
- Valley bottom.
LANDSCAPE:
- Patchy landscape.
Unit 614
26 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Diameter limit: 6"
- Species to cut: SF>WH (cut no other species)
- Contractor-marked skips (105' diameter shown in blue): 8
1:2,606
0 105 210 420 630 840
Feet

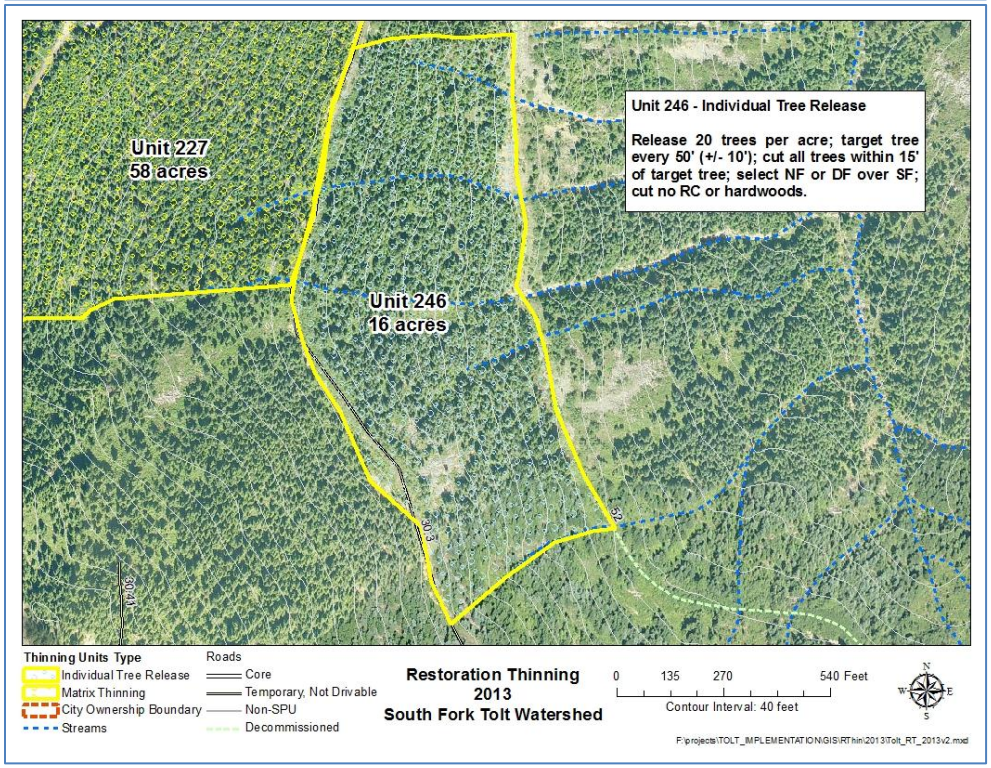
The Tolt Units:

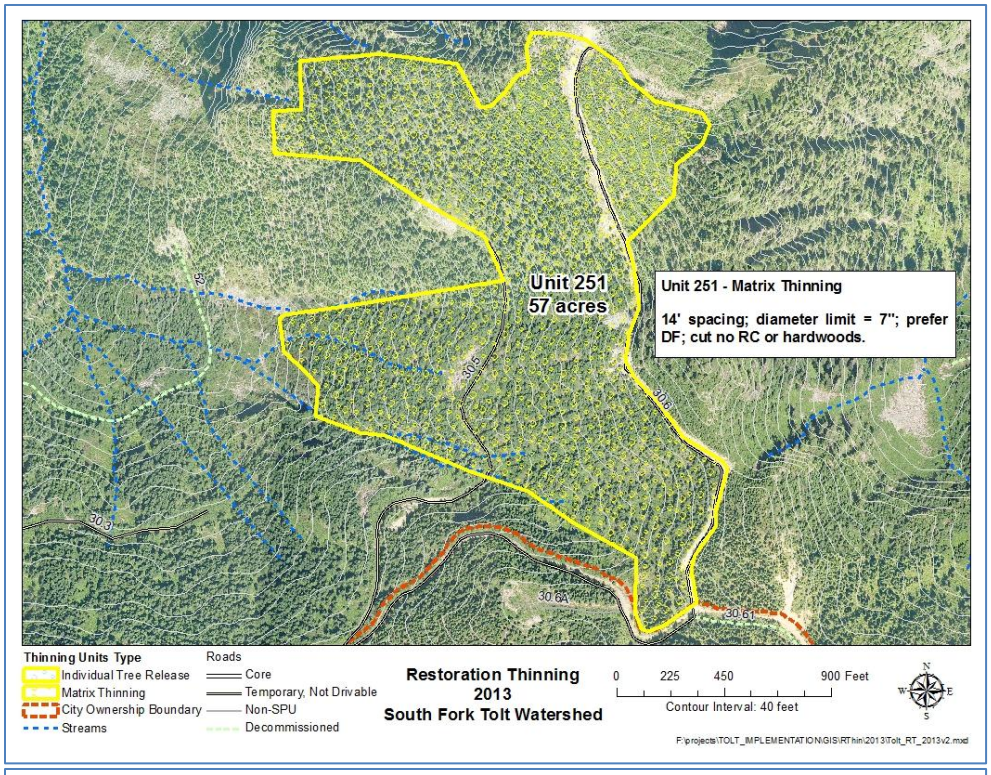


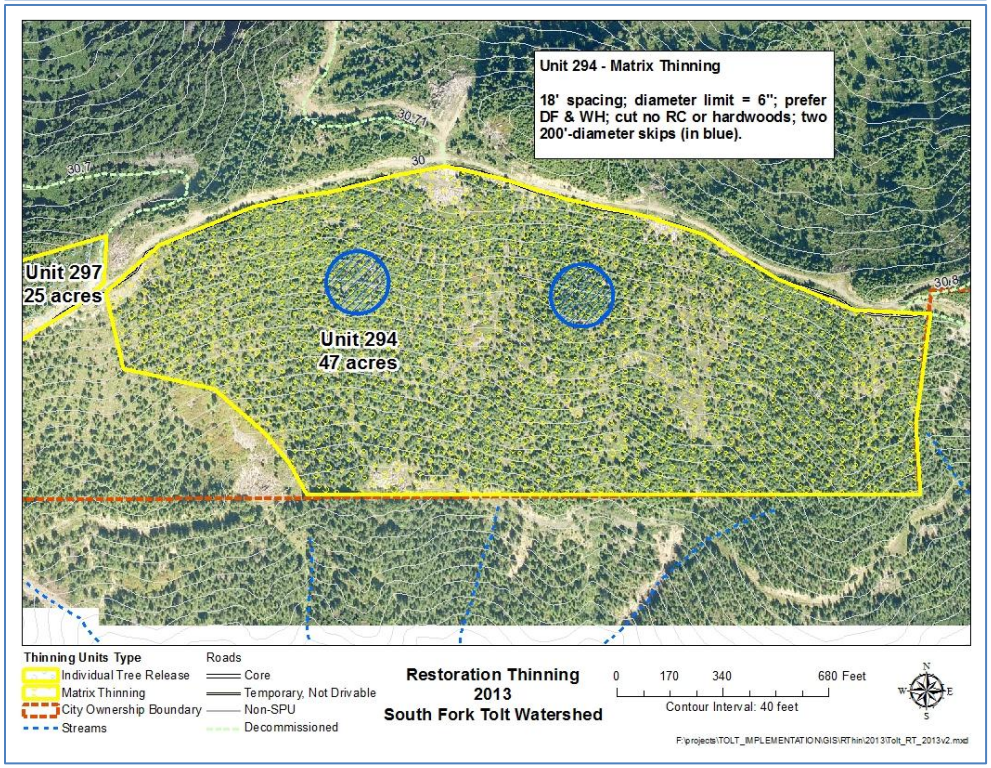

Unit 210
25 acres
Unit 227
58 acres
Unit 210 - Individual Tree Release
Release 20 trees per acre; target tree every 50' (+/- 10'); cut all trees within 15' of target tree; cut no cedar or hardwoods.
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0 110 220 440 Feet
Contour Interval: 40 feet
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd

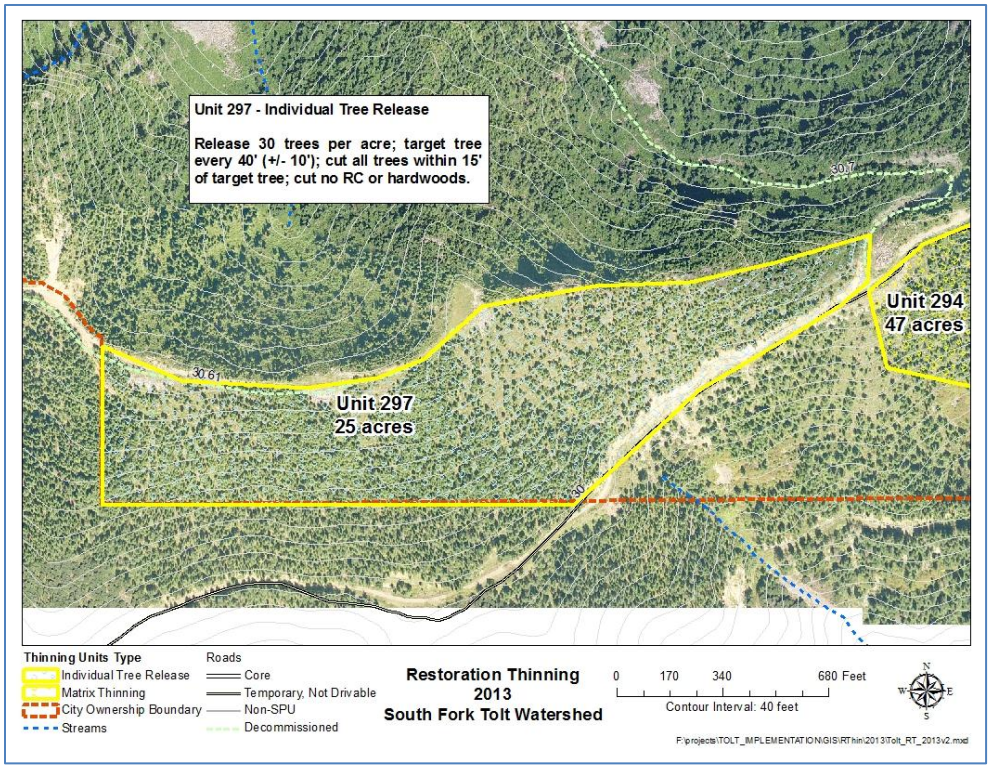

Unit 210
25 acres
Unit 227 - Matrix Thinning
14' spacing; diameter limit = 7"; prefer DF; cut no RC or hardwoods.
Unit 227
58 acres
Unit 246
16 acres
Unit 242
27 acres
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0 190 380 760 Feet
Contour Interval: 40 feet
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd


Unit 242 - Individual Tree Release
Release 20 trees per acre; target tree every 50' (+/- 10'); cut all trees within 15' of target tree; select NF or DF over SF; cut no RC or hardwoods.
Unit 227
58 acres
Unit 242
27 acres
30.42
30.41
30.31
30
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0 140 280 560 Feet
Contour Interval: 40 feet
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd


Unit 246 - Individual Tree Release
Release 20 trees per acre; target tree every 50' (+/- 10'); cut all trees within 15' of target tree; select NF or DF over SF; cut no RC or hardwoods.
Unit 227
58 acres
Unit 246
16 acres
30.43
30.41
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0 135 270 540 Feet
Contour Interval: 40 feet
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd


Unit 251
57 acres
Unit 251 - Matrix Thinning
14' spacing; diameter limit = 7"; prefer DF; cut no RC or hardwoods.
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0 225 450 900 Feet
Contour Interval: 40 feet
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd


Unit 294 - Matrix Thinning
18' spacing; diameter limit = 6"; prefer DF & WH; cut no RC or hardwoods; two 200'-diameter skips (in blue).
Unit 297
25 acres
Unit 294
47 acres
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0 170 340 680 Feet
Contour Interval: 40 feet
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd


Unit 297 - Individual Tree Release
Release 30 trees per acre; target tree every 40' (+/- 10'); cut all trees within 15' of target tree; cut no RC or hardwoods.
Unit 294
47 acres
Unit 297
25 acres
30.7
30.61
30
Thinning Units Type
Individual Tree Release
Matrix Thinning
City Ownership Boundary
Streams
Roads
Core
Temporary, Not Drivable
Non-SPU
Decommissioned
Restoration Thinning
2013
South Fork Tolt Watershed
0
170
340
680 Feet
Contour Interval: 40 feet
N
W
E
S
F:\projects\TOLT_IMPLEMENTATION\GIS\RThin\2013\Tolt_RT_2013v2.mxd

5.0 Lessons Learned

- Sometimes the results of the thinning treatments were not as envisioned during the formulation of the prescription. Either the residual tree density or the volume of the resultant slash was a little high in some areas. This was not due to contractor error, as the contractor generally hit the prescription every time (see compliance quality). It was more due to the specified diameter limit playing an active role in the spacing, which is one of the objectives for this metric. It is a fine balance sometimes in RT units that have relatively larger trees, between too many residual trees and too much slash. Though more pre-treatment data might inform setting the diameter limit with more confidence, I'm not sure the results would really be any different. Thinning areas more heavily that have relatively dense residual trees would result in more slash. Similarly, thinning areas less heavily that have lots of slash would result in a higher density of residual trees.
- In some areas the species selected to be thinned left out abundant species resulting in relatively high residual tree densities. One unit had a high component of noble fir (unit 84C), while two others had lots of mountain hemlock (units 101A and 101B). More pre-treatment data might have avoided this situation through informing a better prescription, although the resulting stands will still benefit from the thinning that did occur. During compliance of these units, I was not very strict in enforcing no cut limits on these species. And in the case of mountain hemlock in units 101A and B, I asked Ramirez to thin them within 10' of the road.
- Ramon's crew had oil leak issues with one of his older vans. A couple of times during the season clean-up had to be done following small leaks while driving. After the second incident along the 200 road, Ramon stopped bringing that van to the watershed and everything was fine.
- Recent studies have shown that young marbled murrelets may not fledge from their nest sites until well into September. The U.S. Fish and Wildlife Service requested that, if possible, we delay any potential disturbance activity (e.g., RT) in proximity (<1/4 mile) to old-growth forest (OG) until after September 22nd (from September 1st). We are sensitive to this request because it comes late in the planning process and we are already working under snow, fire, and labor constraints (e.g., the 2012 RT season was only 12 working-days long). The first thinning crew (Ramon) had enough RT units >1/4 mile from OG to keep them busy until the end of September. Ramirez, on the other hand, had only a couple of such units which they quickly completed. They were allowed to keep working prior to September 22nd in units farthest from OG to minimize potential impacts.
- We will need to re-evaluate the efficacy of thinning on very steep slopes. Some of the units in the Tolt, in particular, were steep enough to pose a safety risk to both the contractors doing the work and staff doing layout and compliance. In hindsight, maybe it was too steep. Unit 103 in the Cedar was designated as a reserve primarily because of a cliff band that bisected the unit. And the reserve

area surrounding unit 104 was so designated partly because of its extreme slope. We should not be afraid to make this call.

- The individual tree release treatment is inconsistent with traditional compliance plot methodology. Randomly distributed 1/50-acre plots will not validate the application of this prescription. Instead, units that had the ITR treatment were walked through by staff to attempt to validate that canopy gaps were placed at appropriate distances throughout the unit. It was difficult at times to determine which individual tree was selected to be released, but creating opportunities for light to penetrate the upper canopy was the primary objective of this treatment. Therefore there is no baseline data for the ITR units going forward.
- Treatment of the understory hemlock thinning unit (CTUT) along the 61 road was relatively easy since the majority of target trees were tall (<30') and skinny (1-4" dbh). An issue occurred partway through thinning the unit, however, relating to spacing to the existing overstory trees. Prior to that point, when spacing of the understory hemlock occurred regardless of the overstory (or any tree >7"dbh), the spacing was fine. SPU staff then instructed the contractor to consider the overstory trees when spacing the understory. This resulted in cutting almost all the understory hemlock and was quickly stopped. For spacing during an understory thinning, the overstory trees should be ignored.
- Having thinning units at both higher and lower elevations provided some versatility when autumn weather brought periodic snow to the upper elevations. Rather than postpone work in the watershed indefinitely during snow events, thinning crews could move to lower elevation units until the snow melted.
- At one point in the season Ramirez had four trucks of thinners totaling about 28 guys. Ramon had his usual 10-12 person crew, and between the two crews they were covering a lot of ground. Fears that they would outpace the compliance effort were never realized because two designated SPU staff were periodically supported by a third person when needed. Part of the Ramirez crew were also conducting lop/pile which required little compliance work by SPU staff.
- The Muckleshoot Indian Tribe (MIT) supplied funding and planning to lop and pile slash in several units (units 26A, 26B, 101A, and 101C) of this year's RT. The objective of this work was to promote/maintain the existence of huckleberry in traditional gathering areas and to facilitate pedestrian access to the areas for gathering. The contractor (Ramirez) had no problem separating thinning and lop/pile work into two invoices.
- With money left over from the lop/pile effort, MIT also planned and funded the restoration of a small wet meadow at the end of the 680 road (there's a map included in this packet). The objective was to benefit elk/deer habitat connectivity by thinning existing small trees around the meadow, lop/pile all slash, and thin two corridors between the meadow and a patch of nearby old-growth forest. All of the thinning was less than an acre.

- Just because a sanican does not have solid waste in it does not mean it doesn't need cleaning.

6.0 Status of RT Program in the CRMW

The RT program under the CRW-HCP was designed to treat roughly 10,480 acres in 15 years, ending in 2014. The cost commitments ($2,620,000), however, were reached this year after treating 10,041 acres. Table 2 summarizes the acres of young forest treated under this program. Included in the table are five years of pre-commercial thinning conducted prior to the adoption of the CRW-HCP, non-HCP RT funded by other sources, and RT in the Tolt in 2013.

Table 2. Summary of the RT program in the CRMW.

Management	Year	Acres Treated	Treatment Summary						
			# Subunits	Thinning Spacing (ft)	Maximum Diameter Limits	Skips	Gaps	Slash Treatment	Girdling
Pre-HCP	1995	590	28	12	Y	N	N	N	N
	1996	671	7	13	Y	N	N	N	N
	1997	455	2	6-13	Y	N	N	N	N
	1998	166	2	13	Y	N	N	N	N
	1999	0							
CRW-HCP	2000	499	8	13	Y	N	N	N	N
	2001	1,282	9	15	Y	N	N	N	N
	2002	1,372	8	15	Y	N	N	N	N
	2003	1,154	14	12-15	Y	N	N	N	N
	2004*	1,017	16	13-16	Y	N	N	Y	N
	2005	683	17	12-18	Y	N	Y	Y	N
	2006**	362	13	11-17	Y	Y	Y	Y	N
	2007	637	25	12-18	Y	Y	Y	Y	N
	2008	699	43	8-18	Y	Y	Y	Y	Y
	2009	598	19	10-18	Y	Y	Y	Y	Y
	2010	573	27	12-18	Y	Y	Y	Y	N
	2011	482	20	13-18	Y	Y	N	Y	Y
	2012	171	8	13-18	Y	Y	N	N	N
	2013***	929	33	13-45	Y	Y	Y	Y	N
Total	Non-HCP	2,554							
	HCP	10,041							
Grand Total		12,595							

*Includes 370 acres (Selleck and Foothills) funded by BPA (non-HCP).

**Includes 47 acres (Trillium) funded by BPA (non-HCP).

***Plus 255 acres in the Tolt.

HCP funding for this program is complete.